

MONTHLY WEATHER REVIEW.

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No. 4.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during April, 1884, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given and their approximate paths shown on chart i.

April has not been especially noted for unusual meteorological phenomena.

Local storms were of less severity and frequency than those of the preceding months.

The high stage of water in the lower Mississippi river has continued, and at the close of the month the river was above the danger-line in the vicinity of Vicksburg, Mississippi, and at points southward.

The month was colder than the average over nearly the whole country, the exceptions being New England, northern plateau, and north Pacific coast region, where it was slightly warmer than usual. The regions of greatest departure below the normal temperature were the middle slope, southern plateau, and upper Mississippi valley, where the deficiencies varied from 3° to 4° .

The monthly precipitation was excessive in New England, the upper lake region, and from the lower Missouri and west Gulf states to the Pacific coast. It was less than the average over the region from Idaho to Minnesota, in the upper Mississippi valley, and from the lower lake region and middle Atlantic states southward to the Gulf.

The temperature and rainfall observations in the cotton districts were resumed April 1st. A table of means for April, 1884, and for the same month of the two preceding years has been prepared and is published in this REVIEW.

The following changes have been made in the numbers of the charts accompanying this REVIEW: chart ii. (ocean storm-tracks and limits of ice) is discontinued, and a new chart, numbered i., is substituted, showing the tracks of low-barometer areas, together with the ocean storm tracks and the limit of the ice region.

The charts heretofore numbered iii. (isobars, isotherms, and winds) and iv. (precipitation) are changed to numbers ii. and iii., respectively.

In the preparation of this REVIEW the following data, received up to May 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and sixty monthly

journals, and one hundred and fifty-four monthly means from the former, and fifteen monthly means from the latter; two hundred and sixty-three monthly registers from voluntary observers; fifty-one monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Alabama, Georgia, Illinois, Indiana, Louisiana, Missouri, Nebraska, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for April, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii. An area of barometric maxima extends from central Montana to Lake Michigan, where the mean pressures range from 30.0 to 30.07. Along the western coast of Florida and on the Pacific coast the barometric means vary from 30.0 to 30.03. The mean pressure of the month is least in New England and the Canadian maritime provinces, where the means vary from 29.75 to 29.85. Over an area including parts of Colorado, New Mexico, Arizona, and Utah the mean pressure is below 29.9; elsewhere the means vary from 29.9 to 29.99.

The mean pressure for April compared with that for the preceding month shows an increase ranging from .01 to .03 in the north and middle Pacific coast regions and in northern Minnesota. In all other districts a decrease occurs. West of the Mississippi river the deficiencies vary from .01 to .08, while to the eastward they increase to from .10 to .13 from the lower lake region to the south Atlantic coast, and to from .15 to .18 in the middle Atlantic states and New England.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

In the northern and middle slopes, upper Missouri valley, Minnesota, and over Lake Superior the mean pressure for April varies from .01 to .04 above the normal. In all other districts it is below the normal, the deficiencies being greatest on the Atlantic coast, where they vary from .10 to .15. On the Pacific coast, in southern Arizona and in the east Gulf states the deficiencies range from .05 to .08; in the upper Mississippi and lower Missouri valleys, southern slope and west Gulf states they vary from .01 to .04.

BAROMETRIC RANGES.

The barometric ranges were greatest in the upper lake region and in Maine, where they exceeded 1.25; they were least in southern California, Arizona, and Florida, where they were less than .50. The extreme ranges are: smallest, .33 and .36 at Forts Grant and Apache, Arizona, respectively; greatest, 1.35 at Eastport, Maine, and 1.40 at Alpena, Michigan.

In the several districts the barometric ranges varied as follows:

New England.—From 1.05 at New Haven, Connecticut, to 1.35 at Eastport, Maine.

Middle Atlantic states.—From .95 at Lynchburg, Virginia, to 1.08 at Delaware Breakwater, Delaware; Barnegat City, New Jersey, and Cape Henry, Virginia.

South Atlantic states.—From .54 at Jacksonville, Florida, to 1.02 at Kitty Hawk, North Carolina.

Florida peninsula.—From .45 at Cedar Keys to .57 at Sanford.

East Gulf states.—From .51 at Mobile, Alabama, to .71 at Vicksburg, Mississippi.

Western Gulf states.—From .64 at Galveston, Texas, to .74 at Little Rock, Arkansas.

Rio Grande valley.—From .63 at Rio Grande City, Texas, to .64 at Brownsville, Texas.

Tennessee.—From .59 at Chattanooga to .78 at Memphis.

Ohio valley.—From .80 at Louisville, Kentucky, to 1.00 at Pittsburgh, Pennsylvania.

Lower lake region.—From 1.06 at Cleveland, Ohio, to 1.19 at Detroit, Michigan.

Upper lake region.—From 1.09 at Chicago, Illinois, to 1.40 at Alpena, Michigan.

Extreme northwest.—From 1.03 at Fort Buford, Dakota, to 1.24 at Bismarck, Dakota.

Upper Mississippi valley.—From .78 at Cairo, Illinois, to 1.28 at Saint Paul, Minnesota.

Missouri valley.—From .92 at Leavenworth, Kansas, to 1.13 at Fort Bennett, Dakota.

Northern slope.—From .67 at Helena, Montana, to .91 at North Platte, Nebraska.

Middle slope.—From .55 on the summit of Pike's Peak, Colorado, to .88 at West Las Animas, Colorado.

Southern slope.—From .52 at Fort Davis, Texas, to .67 at Fort Concho, Texas.

Southern plateau.—From .33 at Fort Grant, Arizona, to .53 at Prescott, Arizona.

Middle plateau.—From .70 at Salt Lake City, Utah.

Northern plateau.—From .65 at Boise City, Idaho, to .77 at Lewiston, Idaho.

North Pacific coast region.—From .74 at Portland, Oregon, to .77 at Roseburg, Oregon.

Middle Pacific coast region.—From .60 at Red Bluff, California, to .66 at San Francisco, California.

South Pacific coast region.—From .39 at San Diego, California, to .52 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

Six areas of high barometer have appeared within or near the limits of the stations of observation during the month. Three of these areas probably passed from the Pacific coast eastward over the Mississippi valley; two appeared in the extreme northwest, and passed eastward, north of the lake region, and one apparently passed northward along the coast of California, and then disappeared to the westward.

I.—At the 7 a. m. report of the 1st the barometer was generally above the normal on the Pacific coast, and during the succeeding twenty-four hours these conditions extended over the Rocky mountain regions, the pressure becoming greatest from Texas northward to Dakota, attended by freezing, fair weather, and northerly winds. This area moved southeastward to eastern Kansas during the 2d, causing a "norther" on the Texas coast, the wind attaining a maximum velocity of 40 miles per hour at Indianola. By the morning of the 4th the centre had advanced to the lower Mississippi valley, where the barometer was 30.19, showing a decline of pressure at the centre, while the barometer had risen at eastern stations. The winds shifted to easterly in the west Gulf states, with increasing force during the 4th, and a severe disturbance developed on the Texas coast, which caused this area to disappear before reaching the Atlantic coast.

II.—This area was first observed on the Pacific coast west of Oregon on the morning of the 3d. The morning report of the 4th placed the centre of the area north of Montana, the barometer being about .20 above the normal from Manitoba westward

to the north Pacific coast. This area remained east of the Rocky mountains, and central in the extreme northwest from the 4th until the 10th the barometer ranging from 30.20 to 30.40. On the afternoon of the 10th it extended over the Missouri valley from Manitoba, and continued its southeasterly course over the central Mississippi valley, causing cool, fair weather and light frosts as far south as the northern portion of the Gulf states on the 10th and 11th. During the 11th this area moved directly eastward over the Ohio valley, and on the morning of the 12th it had reached the southern portion of the middle Atlantic states. The pressure remained above the normal on the middle Atlantic coast during the 13th, while a secondary area of high barometer formed to the north of the lower lake region. On the 14th the centre of greatest pressure again passed to the middle Atlantic coast, and from this point the course of this area was to the northeast, the pressure increasing as it moved over the coast line northeast of New England. When last observed on the 18th the centre apparently reached the fiftieth parallel, north of Sidney. This area was traced from the Pacific coast, and was sufficiently well-defined to render it possible to trace its movements from the tri-daily reports from the 3d until the 18th.

III.—There was a slight increase of pressure on the afternoon of the 14th in the region north of Montana, which indicated the advance of an area of high barometer from the northward. The morning report of the 15th exhibited a well-defined low area in the upper lake region—barometer 29.23—while this area was central north of Manitoba, where the barometer was 30.12 and the temperature 16°. During the 16th and 17th it passed over the upper lake region, with but slight energy, and then disappeared to the northeast, apparently joining high area II., which was at that time moving northward over the Atlantic.

IV.—The barometer rose rapidly during the night of the 17th at stations north of Montana, and the temperature fell from 54° to 25°, attended by heavy snow. The 7 a. m. report of the 18th indicated the advance of a cold wave from the extreme northwest. Light snow and freezing weather was reported from Colorado northeastward to Minnesota, and the barometer had risen to 30.59 north of Dakota at midnight of the 18th. The maximum reading of the barometer occurring during the month was observed as the area passed eastward over Manitoba during the 19th and 20th. On the last-named date the barometer was above 30.7 at Fort Garry, and the temperature was below 20°. This area extended eastward to the Saint Lawrence valley, while the centre remained north of Lake Superior during the 21st, 22d, and 23d. The pressure gradually declined with an apparent west or northwest movement after the development of the depression in the Southern states immediately to the south of this area. It disappeared on the 24th as a well-defined high area, although the barometer was above the normal in the Mississippi and Missouri valleys and upper lake region.

V.—This area was at no time well defined, but the reports from the Pacific coast from the 23d until the 26th indicated that a high area moved northward west of, and near, the coast line. After reaching the Oregon coast, apparently its course changed to the southwest, and it disappeared, followed by general rains as far south as central California.

VI.—On the morning of the 28th this area was observed in the region northwest of Lake Superior, and the succeeding report indicated that it was moving in a southeasterly direction. It extended over the lake region during the 29th, but disappeared rapidly in advance of the well-marked depression which was then central in Dakota. After passing to the upper Saint Lawrence valley the direction of the movement changed to the northeast, and at the last report of the month the pressure had fallen to 30.16 near the centre, which was then near Quebec.

AREAS OF LOW BAROMETER.

Nine areas of low barometer have been traced over the territory included within the limits of the stations of observation.

Five of these areas passed over western Kansas and eastern Colorado; one passed from the Pacific coast eastward north of Montana; two passed over the middle Atlantic and New England coasts; two passed eastward over the south Atlantic coast, and two followed the course of the Saint Lawrence valley. Several small areas, which have not been traced as separate disturbances, developed within the limits of the stations. These were usually secondary depressions which attended well marked disturbances traced as storm-centres.

The following table gives the latitude and longitude in which the several depressions were first and last observed and the average hourly velocity of each depression.

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.....	38 00	102 00	43 00	62 00	20.0
II.....	46 00	98 00	29 00	80 00	34.5
III.....	39 00	75 00	44 00	60 00	22.5
IV.....	39 00	103 00	47 00	76 00	17.5
V.....	45 00	112 00	32 00	97 00	16.5
VI.....	26 00	100 00	38 00	84 00	*16.0
VII.....	53 00	117 00	53 00	104 00	14.0
VIII.....	39 00	102 00	50 00	69 00	22.0
IX.....	39 00	102 00	49 30	89 00	21.1
Mean hourly velocity.....					20.7

* Average velocity before separating.

I.—This storm was well defined as a disturbance central in eastern Colorado on the last day of the preceding month. It increased in energy and moved slightly north of east during the 1st, passing over the central valley as an elliptical area enclosed by isobars of 29.5 to 29.8, the major axis of the ellipse being parallel to the course of the storm. As the storm moved eastward of the Mississippi river violent gales occurred in the lake region, general rains prevailed in the southern quadrants of the storm, and heavy snows were reported in the northern portion of the lake region. Violent local storms also occurred in the southern states on the night of the 1st, when the centre of this disturbance was passing eastward over the Ohio valley. The barometer continued to fall at the centre as the storm approached the Atlantic coast, and when the centre had reached the New Jersey coast on the afternoon of the 2d it had fallen to 29.11 at Barnegat City, and 29.14 at New York City, attended by northerly winds ranging from 30 to 40 miles per hour at stations on the coast between Cape Hatteras and Boston. This storm increased in violence after reaching the New England coast, and during the 3d an easterly gale occurred at Eastport, the maximum velocity being 50 miles per hour. This storm was retarded in its easterly course after passing the longitude of Halifax, and it apparently moved westward to Yarmouth during the night of the 3d, the barometer being lowest and reading 28.73 at Yarmouth on the morning of the 4th. Dangerous northwest winds continued on the coast north of Cape Hatteras on the 4th as the centre of the disturbance disappeared to the eastward over the Atlantic.

II.—This depression formed south of Texas immediately after the advance of a high area over the Gulf states. The winds shifted to easterly on the west Gulf coast during the night of the 4th, reaching a velocity of 34 miles at Indianola, and afterwards 44 miles from the northwest at the same station, when the centre of the disturbance was to the east of that station. Very heavy rain fell at all Gulf stations as the storm moved eastward almost parallel with the coast. Strong gales occurred in the Gulf on the 5th and 6th, but the storm lost energy as it passed over northern Florida, and when it was last observed it could scarcely be defined as a cyclonic disturbance.

III.—The 3 p. m. and midnight reports of the 8th indicated the partial development of a low area on the middle Atlantic coast, central near Norfolk, and also a slight depression in the lower lake region. These conditions continued until the morning of the 9th, when the disturbance on the middle Atlantic

coast moved northward to near Cape May, and light snows and rains prevailed in the middle Atlantic states and lake region. This storm, although contracted, passed along the southern New England coast, developing considerable energy, the wind-velocities ranging from 30 to 52 miles per hour, the strongest winds being in the western quadrants. The centre of disturbance passed northeastward from New England, and it was last observed near Halifax at midnight of the 10th.

IV.—This depression probably developed on the Pacific coast, as the general barometric condition during the 11th and 12th indicated the advance of an extended area of depression over the Rocky mountain region and British America. The centre could not be definitely located until the afternoon of the 13th, when it was in eastern Colorado. The disturbance moved first to the northeast over Nebraska and Iowa, causing general rains in the central valleys during the 14th. A secondary depression formed in the lower Ohio valley at midnight of the 14th, while the main centre remained in the upper Mississippi valley. The rains were specially heavy in the Southern states and near the track of the principal depression in the lake region. The storm increased in violence as it passed over the upper lake region, the barometer falling to 29.2, when the centre was near Port Huron, Michigan. The rains extended over the Atlantic coast districts on the 15th, followed by clearing weather on the 16th, when this depression disappeared to the northeast in the Saint Lawrence valley.

V.—On the 14th general rains prevailed on the Pacific coast, accompanied by low barometer, and the pressure declined in the Rocky mountain districts on the 15th, the centre of depression being near Eagle Rock, Idaho, at midnight of the 15th. The course was not clearly defined, as this disturbance disappeared on the eastern slope of the Rocky mountains without passing eastward. It moved southeastward during the 16th and 17th over Utah, Colorado, and western Kansas, and disappeared in the Indian Territory at 3 p. m. of the 18th, while the succeeding area, number vi., was forming in southern Texas.

VI.—This disturbance was probably a secondary depression following the disappearance of low area v., but the afternoon report of the 18th exhibited these depressions, one decreasing in energy in the Indian Territory and the other slowly developing in extreme southern Texas. This storm moved eastward over the western Gulf during the 19th, and as the cold air from the high area, which then extended over the eastern slope districts, reached the Gulf coast, this storm passed rapidly to the east, followed by a "norther" which caused a maximum velocity of fifty-six miles at Indianola. After reaching the mouth of the Mississippi river, the course of this storm changed to the northward, and it passed over the eastern Gulf states during the 21st, causing general rain in the Southern states. At midnight of the 21st, two areas were formed, one on the south Atlantic coast, which disappeared east of Charleston on the 22d, causing no marked disturbance, and the other in central Tennessee. This last depression moved very slowly northward attended by general rains in the Ohio valley and Tennessee until the morning of the 23d, when it was last observed as central in eastern Kentucky.

VII.—This depression was at no time within the limits of the Signal Service stations. It probably passed from the north Pacific coast region to British Columbia, where it was first observed on the morning of the 24th. It passed directly east, north of the boundary of the United States and disappeared north of Dakota on the 25th.

VIII.—On the morning of the 25th this disturbance was forming in eastern Colorado, while the pressure was below the normal at the northern stations. This low area followed the preceding one and probably resulted from the same general condition. After moving to the southward for eight hours on the 25th, it passed directly to the northeast over the Missouri and Mississippi valleys on the 26th as a well-marked cyclonic disturbance, which increased in energy as it approached Lake Superior. The barometer fell to 29.29 at Saint

Paul as the centre passed near that station on the 27th, and the rains were heavy in the northwest. Dangerous winds occurred at stations in the lake region, the highest velocities occurring after the centre had passed to the east of Lake Superior. At Milwaukee the wind attained a velocity of fifty-three miles per hour from the west during the night of the 27th. This storm lost energy rapidly after the center passed to the east of the lake region, and when it was last observed in the lower Saint Lawrence valley on the night of the 28th, the pressure had increased to 29.90 at the centre of disturbance, and no dangerous winds were reported.

IX.—An extended area of low barometer was central in Utah on the 28th, and this depression probably originated to the westward of the Rocky mountains on the 27th. On the 29th it passed almost directly north over Dakota and it was central near the northern boundary of that territory on the morning of the 30th. The last high area observed during the month was at that time immediately to the northeast of this depression, and the course of the low area indicated that the abnormal direction of movement was due to the high area. After the disappearance of the high area on the 30th, the course of ix. changed to easterly and was central north of Lake Superior at the close of the month.

NORTH ATLANTIC STORMS DURING APRIL, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0-10.]

The tracks of the storms appearing in the north Atlantic ocean during the month have been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to May 22, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Of the seven depressions charted, only two, numbers, iii. and iv., are apparently continuations of storms which passed over the north American continent. Numbers i. and ii. are extensions of the tracks of storms which were traced on the chart for the preceding month (March). Numbers v. and vii. are depressions which originated near the coasts of the United States, and which apparently filled up before passing to the eastward of the banks. Number vi. developed near the twenty-fifth meridian and moved towards the British coasts. The first half of the month was characterized by moderate to strong gales and low barometer, the area of low pressures being apparently very extensive and reaching southward to the Azores. During the last half of the month an area of high pressures appears to have spread westward and southward, thus checking the eastward movement of depressions iv., v. and vii. During this period moderate breezes and fine weather prevailed over the Atlantic. The storms traced during the month have moved somewhat south of the usual track of Atlantic storms. That traced as number iii. was notable for the depth of the atmospheric depression, the barometer having fallen to 28.1 (713.7), and for its long duration and storm energy.

The following are descriptions of the depressions charted:

1.—This was a continuation of low area ix. of chart ii. for March. At the close of that month the disturbance was central off the southwestern coast of Ireland; from April 1st to 4th it remained in the region between W. 10° and 15°, and near the fiftieth parallel, the barometer near the centre of depression reading about 29.0 (736.6). On the 5th the centre of disturbance was situated very near the west coast of Ireland, the pressure near the centre having fallen below 29.0 (736.6); the s. s. "Circassian," Lieutenant W. H. Smith, R. N. R., commanding, reported: 5th, in N. 55° 0', W. 12° 30', barometer 28.93 (734.8), wind ne., force 4; bark "Esmeralda," J. C. Anderson, jr., commanding, in N. 55° 23', W. 7° 41', had barometer 28.82 (732.0), wind s., force 2; while vessels between N. 51° and 47°, and W. 13° and 20°, had westerly and northwesterly winds, with pressure varying from 29.0 (736.0) to 29.3 (737.3).

During the prevalence of this depression, the weather was cloudy or rainy, and the wind remained light or moderate, except in the western quadrants on the 1st and 2d, when it attained the force of a moderate gale (6-7.)

2.—This was a continuation of the disturbance traced as low area viii. on the chart for the preceding month. At the close of March, the depression was apparently near the southern edge of the Banks of Newfoundland, with moderate westerly winds in its rear and light southerly winds to the eastward. On April 1st, there was no material change either in the position of the centre of disturbance or in pressure, which still remained about 29.3, (744.2); the disturbance appears to have moved south-eastward on the 2d, attended by moderate winds, and by the 3d, the region of low barometer was shown near N. 40°, W. 40°, where the readings ranged from 29.66, (753.4) to 29.8, (756.9). Vessels on the forty-third parallel and between W. 45° and 40° had easterly and northeasterly winds, of moderate force, and fair weather, and those to the eastward of W. 40° and between N. 40° and 43°, had moderate southerly breezes. By the 4th, this disturbance probably became merged on the large atmospheric depression (number i.) which extended apparently from the Azores northeastward to the British Isles and western France.

3.—This is a continuation of the disturbance charted and described as low-area i., under "areas of low barometer" in this REVIEW. During its passage northeastward along the coast of the United States this depression displayed great storm-energy; the barometer near the centre of disturbance fell below 28.8 (731.5), and moderate southwesterly to very heavy northwesterly gales prevailed off the coast and at sea, the influence of the disturbance extending southward to about N. 30° and eastward to the sixtieth meridian. Many sailing vessels sustained loss of sails and spars and were driven off to the latitude of the Bermudas.

On the 2d Captain A. Cann, commanding the ship "Tsernoga," in about N. 36° 41', W. 68° 01' reported: "barometer fell from 29.65 (753.1) to 29.15 (740.4) in five hours, with steadily increasing sw. wind; at 6 p. m., ship under lower topsails when a tornado squall suddenly appeared, and in five minutes struck the ship taking the new topsails clean from the bolt-rope; it then steadied to a hard gale, gradually hauling to w. with hail-squalls and very heavy cross sea. April 3d (N. 37° 44', W. 67° 00'), weather the same, hard gale veering from w. to wnw., sea between thirty and forty feet high and running very swiftly; 4th (N. 36° 30', W. 67° 0'), weather worse and squalls more frequent, barometer rising steadily."

The s. s. "Orinoco," W. J. Frazer, commanding, between N. 38° 30', W. 71° 21', and N. 35° 15', W. 67° 20', on the 4th and 5th, had heavy nw. gales throughout, with very high sea.

The s. s. "Madrid" came under the influence of the disturbance on the 3d; Captain M. Garson, commanding that vessel, reported: "3d, in N. 35° 11', W. 59° 10', moderate ssw. gale began at 6 a. m., and veered to w. at 7 p. m., in N. 35° 11', W. 60° 44', barometer 29.42 (747.2)." During the 4th, 5th, and 6th, the "Madrid" had w. by s. to wnw. gales of force 7 to 8, moderating on the 6th to nw., force 3, in about N. 35° 20', W. 65° 5'.

The schooner "Geo. R. Congdon," in 39° 5', W. 72° 20', on the 3d, had a heavy wnw. gale, and high cross sea, sleet, and hail, lasting until the 6th; on the afternoon of the 5th, the vessel had decks swept of everything movable, and when the gale abated the ship's position was found to be N. 37° 50', W. 66° 03'.

During these dates the centre of the disturbance where the pressure was about 28.6 (726.4), was situated between the New England coast and the Banks of Newfoundland, its movements being slow and irregular.

The s. s. "Ontario," W. P. Couch, commanding, reported: "on the 3d, in N. 43° 36', W. 69° 30', 3.30 a. m., lowest reading of the barometer 28.52 (724.4), wind from n. to ne., with heavy snow and sleet."

During the 5th and 6th, vessels to the northward of N. 40°

and between W. 60° and 50° had moderate s. to sw. gales; over the region west of the sixtieth meridian, the westerly and northwesterly gales continued with undiminished force.

By the 7th the storm centre, having moved eastward apparently between the parallels of 40° and 45° north latitude, was shown near N. 43°, W. 47°; it moved slowly eastward and on the 8th it was well defined by the reports near N. 44° W. 42°. During the 7th, the winds between N. 45° and 50° and to the eastward of W. 45°, shifted to east and remained moderate; west of W. 60° the northwesterly winds decreased in force, while the southwesterly winds which on the 6th had prevailed between W. 60° and 50°, had now veered to west and north-west, and blew with the force of a heavy gale. The following reports indicate the severity of the storm during the 8th:

The ship "E. B. Sutton," C. O. Carter, commanding, reported: "8 p. m. 7th, in about N. 40° 30', W. 43° 50', wind backing to sse. force 7-8, heavy and continuous rain, barometer 29.35 (745.5) falling rapidly; 11 p. m. ship hove to, head to ene. wind se. by s. force 9, barometer 29.05 (737.9), wind veering to s. At 3.45 a. m. of the 8th, wind sw. force 10, lowest barometer 28.8 (731.5), clearing, with violent squalls; 9 a. m. wind w. force 9, barometer 29.0 (736.6), heavy sea from sw. and w; for the next twenty-four hours strong gale from wnw. and nw., hard squalls, barometer rising very slowly."

Captain Malet, commanding the s. s. "Marengo," furnishes the following interesting observations taken during the 8th and 9th:

Date.	Hour, Greenwich time.	Barometer. (corrected.)		Wind.		Remarks.
		Inches.	Mill.	Direction.	Force, 0-10.	
April 8.....	3 a. m.....	29.20	741.7	se. by s.	5	Position N. 43° 39', W. 41° 27', by D. B.; ship steaming s. 56° w., 9 knots; moderate wind, light rain.
8.....	5 a. m.....	28.95	735.3	se.	6	Heavy rain; gloomy weather.
8.....	6 a. m.....	28.66	729.0	se. by e.	8	Strong gale; continuous rain.
8.....	6.20 a. m.....	28.58	725.9	ese.	10	Squall of hurricane force, lasting seven minutes; raining.
8.....	7 a. m.....	28.62	726.9	ese.	6	Clearing overhead, stars visible, light rain.
8.....	7.30 a. m.....	28.57	725.7	s.	7	Fresh gale, raining, rough sea; brought ship's head ase., easy steam.
8.....	8 a. m.....	28.51	724.1	s.	9	Strong gale, high sea.
8.....	9 a. m.....	28.27	718.0	sew.	10	Hurricane, sea sw., face all foam and spray; lowest barometer reading.
8.....	10 a. m.....	28.27	718.0	sw.	7	Moderate gale, high sea, breaking furiously.
8.....	11 a. m.....	28.27	718.0	sw.	9	Tremendous sea.
8.....	Noon.....	28.29	718.6	waw.	10	Position N. 43° 10', W. 42° 19', by D. B.; hurricane, ship enveloped in spray and drift, sea and horizon invisible.
8.....	1 p. m.....	28.39	721.1	w. by s.	9	Heavy gale, squalls of hurricane force, sea high and irregular, with dangerous breach.
8.....	2 p. m.....	28.45	722.6	w. by s.	8	Decreasing wind, squally, frequent rain.
8.....	4 p. m.....	28.54	724.9	w. by s.	8	Wild and confused sea, frequent squalls and rain.
8.....	5 p. m.....	28.67	728.2	w.	7	Occasional tremendous sea.
8.....	6 p. m.....	28.77	730.7	w.	7	Wind decreasing, frequent squalls and rain till midnight.
8.....	Midnight.....	28.79	731.3	w.	7	Position N. 42° 50', W. 43° 10', by D. B.; highest wave 5 p. m., estimated height 37 feet, length 250 feet, possessing quick collapsing property, with low speed.
9.....	2 a. m.....	28.84	732.5	nw. by w.	7	Wind veering to northward, violent rain squalls.
9.....	4 a. m.....	28.85	732.8	nw. by w.	8	Very high nw. sea.
9.....	8 a. m.....	28.94	735.1	nw. by w.	7	Tremendous, confused sea; ship rolling heavily.
9.....	Noon.....	29.31	744.5	nw. by w.	7	Position N. 42° 06', W. 42° 51', by observation; experienced a set to ene. since noon of 7th of 25 miles; steaming S. 74° W., 7 knots.
9.....	2 p. m.....	29.39	746.5	nw. by w.	6	Moderate gale, cloudy, high, confused sea, with angry breach; heavy swell from nnw.
9.....	4 p. m.....	29.43	747.5	nw. by w.	7	Increasing wind; sea more regular.
9.....	8 p. m.....	29.68	753.9	nw. by w.	7	Moderating.
9.....	Midnight.....	29.77	756.1	nw. by w.	6	Strong wind, cloudy, moderate sea.

The s. s. "Britannic," H. Perry, commanding, reports: "8th,

between midnight and 4 a. m., Greenwich time, wind from wsw. to s. moderate, barometer falling very rapidly; between 4 and 8 a. m., fresh se. to e. breeze; 8 a. m., barometer 28.95 (735.3), increasing wind; noon (N. 45° 00', W. 39° 40'), moderate e. gale, high confused sea, lowest barometer 28.3 (718.8); 1 p. m., wind shifted suddenly to nne. and settled down to a fresh gale with high cross sea, barometer rising; 4 p. m., barometer 28.5 (723.9), wind n.; 8 p. m., 28.73 (729.7), wind nnw., fresh gale; midnight, barometer 29.05 (737.9), wind nnw., fresh gale."

The report of the s. s. "Helvetia," J. W. Rogers, commanding, is as follows:

Date.	Hour. (Greenwich time.)	Barometer (reduced).		Wind.		Remarks.
		Inches.	Mill.	Direction.	Force 0-10	
April 8.....	Noon.....	28.52	724.4	se. by e.	6	Position, N. 45° 16', W. 39° 09'; weather, overcast.
8.....	2 p. m.....	28.52	724.4	see.	6	
8.....	3 p. m.....	28.50	723.9	s.	5	
8.....	4 p. m.....	28.14	714.7	s.	5	Heavy sea coming up suddenly from ssw.
8.....	6 p. m.....	28.10	713.7	wnw.	5	Heavy sw. and confused sea; heavy clouds and threatening appearance.
8.....	7 p. m.....	28.14	714.7	.....	.....
8.....	9 p. m.....	28.26	717.8	wnw.	6	
8.....	10 p. m.....	28.36	720.3	.....	.....
8.....	11 p. m.....	28.38	720.8	nw. by w.	6	
8.....	Midnight.....	28.41	721.6	.....	.....
9.....	2 a. m.....	28.51	724.1	nw. by n.	7	
9.....	3 a. m.....	28.63	727.2	.....	.....
9.....	5 a. m.....	28.73	729.7	nw.	7	Heavy cross sw. and nnw. seas.
9.....	6 a. m.....	28.81	731.8	nw.	6	
9.....	7 a. m.....	28.83	732.3	nw.	6	
9.....	Noon.....	29.18	741.2	nw. by w.	7	Position, N. 42° 31', W. 41° 44'; moderating to fresh breeze during the latter part of the day.

During the 8th the centre of disturbance moved slowly north-eastward and on the 9th it was shown near N. 47°, W. 35°; to the eastward of the thirty-fifth meridian the winds were southwesterly to southeasterly; to the westward of W. 35° they were westerly, northwesterly and northerly.

The s. s. "Wieland," C. Heibich, commanding, appears to have moved eastward in front of the storm-centre, for two or three days, and during that time the southerly winds did not exceed the force of a moderate gale. The following extract is from the report of the "Wieland."

April.	Greenwich time.	Barometer.		Wind.		Position.	
		Inches.	Mill.	Direction.	Force, 0-10.	Lat. N.	Long. W.
8.....	h. m.....	.....	.....	.....	.....	0°	0°
8.....	0 8.....	28.30	718.8	ssw.	6	44 10	40 20
9.....	0 8.....	28.33	719.6	s.	6	46 56	34 33
10.....	0 8.....	28.58	725.9	see.	5	48 57	27 13

The vessels which were moving eastward in the western quadrants of the disturbance experienced a succession of heavy northerly and northwesterly gales, as shown by the following reports of the steamships "Habsburg" and "Zaandam." Captain Pfeiffer of the "Habsburg," reported as follows: "on April 7, at 9.30 p. m., (Greenwich mean time), in latitude 39° 28' N., longitude 52° 00' W. lowest reading of the barometer was 29.13, (739.9), wind nnw. force 4, weather rainy, light squalls. All that day the barometer remained very low, the highest reading being 29.21 (741.9). At 3 hrs. 10 m., of the 8th, barometer 29.19 (741.4), wind nw. force 8 (Beaufort scale), weather fair; at 7 hrs. 6 m., barometer 29.12 (739.6) wind wnw., force 10, squally, rain, rough and increasing nw. sea; 11 hrs. 2 m., barometer 29.14 (740.1), wind nw., 8 to 10; heavy rain-squalls; 13 hrs., barometer 29.15 (740.4), wind since 11 hrs. from nw. and nnw. to n., blowing in furious gusts of force 10-12; 15 hrs., barometer 29.2 (741.7), wind wnw., force 11, rain; very heavy and dangerous cross sea from nw., n. and ne.; at 22 hrs. 45 min., barometer 29.4 (746.7), wind nw. force 9-10, clearing; sea still very high and

dangerous; 2 hrs. 45 m. of April 9th, barometer 29.5 (749.3), wind nw., 9 rain-squalls; barometer slowly rising, weather clearing, with occasional heavy hail-squalls from nw. and nnw.; high n. sea; at 2 hrs. 22 m. of the 10th (about N. 43°, W. 35°), barometer 29.75 (755.6), wind wnw. force 7-6, light squalls."

The s. s. "Zaandam," E. M. Chevalier, commanding, reported: "from 7th, in N. 42° 00', W. 47° 01' till the 9th, in N. 43° 54', W. 41° 31', heavy gales from nne., backing to nw., with very high sea from all directions; the barometer read 29.22 (742.2) at 11 p. m., Greenwich time, on the 7th and gradually fell to 28.52 (724.4) at 7 a. m. on the 8th; it then began to rise slowly and at 3 p. m. on the 9th it read 29.28 (743.7) wind nnw., force 8."

The s. s. "Denmark," W. Tyson, commanding, on the 8th was in N. 46° 37', W. 28° 35' and steering s. 65° w. reported as follows: "0 h. 8 m., wind se., force 2, increasing to force 5 at 4 hrs., barometer 29.34 (745.2), falling; 9 hrs., wind ssw., force 7; 10 hrs., wsw., force 8; 14 hrs., sw. force 8, sea rough; 20 hrs., wind sw., force 9, sea heavy; 22 hrs., sw., force 6. On the 9th, 0 h. 8 m., (in N. 45° 24', W. 32° 21') barometer 28.66 (728.0) wind w., force 6; 4 hrs., barometer 28.6 (726.4) wind wnw., force 6; 6 hrs., barometer 28.76 (730.5) wind wnw., force 8; 7 hrs., wind nw., force 9, with squalls of force 10, and tempestuous sea; 18 hrs., wind nnw., force 10."

Capt. H. C. Williams, commanding the s. s. "Oregon," between N. 48° 30', W. 39° 09' and N. 45° 27', W. 39° 26', from noon of the 9th to noon of the 10th, reported as follows: "9th, 6 p. m. (Greenwich time), lowest reading of the barometer 28.5 (723.9), whole gale, wind commencing at se. and backing by ne. to nw."

The U. S. steamer "Alert" had the gale in about N. 44°, W. 36° on the 9th, and had one boat stove.

Captain Park, of the s. s. "Scandinavian," referring to the gale, reports as follows: "8th, 10.20 a. m. (Greenwich time), barometer 28.94 (735.1), wind e. by n., force 6; noon (N. 46° 10', W. 40° 1'), barometer 28.72 (729.5), wind veering to ne., with rain and heavy squalls; 5.50 p. m., lowest reading 28.25 (717.5), wind nne., force 6 and increasing, barometer rising; 6.50 p. m., blowing a strong gale from n., with high confused sea and heavy swell from ssw.; 8 p. m., barometer 28.34 (719.8), same wind and weather; midnight, barometer 28.52 (724.4), wind nnw., force 8, sea high and breaking. At 4 a. m. on the 9th, the barometer read 28.9 (734.0), wind n. by w., force 8; 8.45 a. m., barometer 29.16 (740.7); at 10.45 a. m. a heavy sea struck the ship, smashing boats and staving in the funnel, rounded the ship to and found one man missing, he having been washed overboard and lost; at noon (N. 43° 38', W. 44° 47'), the barometer read 29.47 (748.5), wind n. by w., force 7."

During the 9th the disturbance moved slowly northeastward and by the 10th, it was central between N. 30° and 27°, the pressure near the centre ranging from 28.58 (725.9) to 28.86 (733.0).

S. s. "Hohenstaufen," H. Winter, commanding, was between N. 49° 29', W. 17° 20' and N. 47° 18', W. 29° 14' from the 9th to 11th, and reported as follows: "9th, 8 p. m., barometer 29.26 (743.2), wind sw., force 6, rain at intervals, sea swell increasing. 10th, 0 h. a. m., barometer 29.16 (740.7) wind s. by w., force 6; 4 a. m., barometer 29.01 (736.8), wind s. by w., force 6, overcast and squally; 8 a. m., barometer 29.10 (739.1), wind ssw., force 6, increasing; noon, (position not given), barometer 28.86 (733.0), wind ssw., force 8, very heavy sea, ship laboring heavily; 4 p. m., barometer 29.02 (737.1) wind sw. by s., force 8, rain and very heavy sea; 8 p. m., barometer 29.18 (741.2), wind sw. by w., force 8. At 8 a. m. on the 11th, the wind was nw., force 6 and the barometer had risen to 29.71 (754.6)."

On the 10th, very heavy northwesterly gales continued over the region between N. 40° and 50° and W. 40° and 30°; to the westward, between the fortieth and sixtieth meridians, the wind had moderated and hauled again to southward in advance of low area iv., which was now off the coast of Nova Scotia. During the 11th, low area iii. appears to have rapidly diminished in energy, the pressure over the region near W. 25°

having increased about one inch, and the winds became moderate. On 12th and 13th, an area of high pressures formed over the region east of the twenty-fifth meridian, and the depression rapidly filled up.

4.—This was a continuation of low area iii. described under "areas of low barometer," in this REVIEW. On the 10th the disturbance was off the coast of Nova Scotia; as it moved eastward its presence began to be felt during the afternoon, by the s. s. "Marengo," as shown by the shifting of the winds. When that vessel got beyond the influence of low area iii. the barometer rose to 29.91 (758.7), at noon of the 10th (N. 41° 32', W. 47° 00') wind wsw. force 3. By 4 p. m. the barometer had fallen to 29.76 (755.9), and the wind was sse. freshening, rainy weather; at midnight of the 10th, the barometer read 29.58 (751.3), wind ssw. heavy sea swell. At the centre of disturbance, which at midnight of the 10th was near the coast of Nova Scotia, the pressure was about 29.3 (744.2). By the morning of the 11th, the region of least pressure was transferred to about N. 45° W. 45°, where the pressure was 29.4 (746.7) to 29.65 (753.1). Moderate southerly gales prevailed over the region between W. 43° and 35°, with moderate to strong westerly to northwesterly gales from the coasts of the United States and Nova Scotia eastward to W. 45°. On the 12th the s. s. "State of Georgia," G. Moodie, commanding, reported in N. 44° 42', W. 42° 00', barometer 29.51 (749.5), calm; unsettled, rainy weather. Vessels between N. 45° and 50° and W. 40° and 30°, had moderate southerly winds, while to the westward of the s. s. "State of Georgia," the winds were westerly and northerly, moderate to strong in force. During the 13th the depression appears to have been forced southward by an area of high pressure which was north of N. 50° and east of W. 30° and which appeared to be spreading southwestward. By the 14th, the pressure had increased to 29.8 (756.9), the area of low pressure being pushed farther to the westward, and during the day the depression filled in. On the 15th, the atmospheric pressure over the Atlantic from W. 40° westward to the coast of the United States was above 30.0 (762.0); north of N. 45° and from W. 40° eastward to W. 15° it was above 30.15 (765.8). (No reports have been received from the vicinity of the Azores).

5.—This depression appeared off the New England coast during the 16th and 17th, and was probably subsidiary to low-area iv., which passed northeastward from Illinois to the Saint Lawrence valley, and is described under "areas of low barometer" in this REVIEW. When near the coast the lowest reported pressure was about 29.8 (756.9). During the 18th, 19th and 20th the disturbance moved slowly northeastward and eastward, the pressure remaining unchanged; on the last-mentioned date the depression apparently dissipated without having exhibited any decided storm-energy.

6.—The pressure, which for several days had been high over the region north of the fiftieth parallel and between W. 15° and 30°, began to give way during the 21st, and by the 22d it had decreased to 29.9 (759.4) near N. 50°, W. 25°. During the 23d and 24th the disturbance apparently moved eastward to the British Isles, followed by moderate northwesterly winds in its rear. On the 25th centre of depression was off the Irish coast.

7.—This disturbance was central south of Nova Scotia on the 26th, the pressure near the centre being about 29.3, (744.2). During the 27th and 28th, it moved eastward with slowly increasing pressure; on the 29th the course changed to the north-northeastward and at the close of the month the depression was shown off Cape Breton Island.

OCEAN ICE.

Chart i. also exhibits the southern and eastern limits of icebergs observed in the north Atlantic ocean during the period from April 12th to May 10th. This chart is based on reports sent by shipmasters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published in the "New York Maritime Register."

During the above-mentioned period the southern limit of the ice region was in N. 41° 26', and its eastern limit near W. 46°. Fewer icebergs have been observed than in the preceding months; the marked falling off in the number of reports referring to icebergs seems to indicate that these are rapidly disappearing, at least over that part of the ice region usually traversed by transatlantic steamers. Icebergs were observed farther to the westward than heretofore.

Compared with the chart for the preceding month (March-April) there has been no southerly movement, but a decided change is shown in the position of the eastern limit of the ice-region, it being now about 5° west of that for the preceding month.

A comparison with the chart for the corresponding period of 1883, shows no great difference in the extent of the ice-region. In April-May 1883, the southern and eastern limits were each about half a degree south and east of those for the present year.

A comparison with the chart for the corresponding period in 1882, shows a wide difference in the limits of the ice-region. In 1882, the southern limit extended to N. 40°, or about one and a half degrees further south than in the present year; the eastern limit was near W. 41°, or five degrees east of the present limit. In 1882, icebergs and field-ice were reported as more numerous than in 1884.

Icebergs were reported as follows:

April 12th.—S. S. "Circassian," in N. 42° 58', W. 49° 42', passed a large iceberg; s. s. "Oregon," in N. 44° 23', W. 50° 12', passed an iceberg.

15th.—S. S. "Republic," in N. 41° 13', W. 48° 22', passed a piece of ice.

16th.—S. S. "Brooklyn City," in N. 43°, W. 53°, passed two large icebergs and a quantity of small ice; s. s. "Nevada," in N. 42° 46', W. 51° 15', passed an iceberg.

17th.—S. S. "Oregon," in N. 42° 30', W. 52° 00' saw several pieces of ice.

18th.—S. S. "Furnessia," in N. 42° 40', W. 52° 10' passed a small iceberg.

19th.—S. S. "Saint Ronans," passed a large ice field; steered southward for two hours to clear it; its southern point was in N. 41° 33', W. 47° 16'.

24th.—S. S. "Eider," in N. 43° 57', W. 49° 9' passed a large iceberg bearing n. by w. $\frac{1}{4}$ w., five miles distant; in N. 43° 56', W. 49° 13' passed another large iceberg, same bearings, three miles distant; both aground. In N. 43° 53', W. 49° 24' passed a large iceberg bearing n. by w. $\frac{1}{4}$ w., about eight miles distant; in N. 43° 47', W. 50° 54' passed a very large iceberg bearing n. $\frac{1}{4}$ w., about seven miles distant.

23d.—S. S. "Lord Clive," in N. 42° 40', W. 47° 10', passed an iceberg; also in N. 42° 38', W. 47° 4', passed two small bergs.

24th.—S. S. "Arizona," in N. 44° 00', W. 48° 54', passed a large iceberg; also in N. 43° 54', W. 49° 16', passed two others; bark "Victoria," in N. 41° 26', W. 48° 46', passed an iceberg about two hundred feet high and table shaped, bearing n. about ten miles.

25th.—S. S. "Austral," in N. 42° 10', W. 50° 45', passed an iceberg; s. s. "Grecian Monarch," in N. 42° 20', W. 50° 30', passed an iceberg.

26th.—S. S. "Bolivia," in N. 42° 18', W. 50° 31', passed a large iceberg.

29th.—Bark "Lynnwood," in N. 45° 15', W. 56° 51', passed two large icebergs. Bark "Scotland," at New York, May 3, reported a number of icebergs, varying in length from one hundred to five hundred feet, between N. 44° 10', W. 48° 20' and N. 44° 0', W. 51° 10'.

Captain Tranmar, of the s. s. "Lake Champlain," at Quebec, May 1st, reported: "first met ice on the eastern edge of the Banks, in latitude 45° 50' N. on April 23d, and continued to pass icebergs till within a short distance of Cape Race; met gulf ice at midnight of April 27th off South Point, Anticosti, and cleared it at noon on the 29th, having steamed through seventy miles."

May 4th.—S. S. "Oder," in N. 43°, W. 50°, passed a large iceberg.

8th.—S. S. "Ohio," in N. 42° 30', W. 47° 48', passed three large and several small icebergs.

9th.—S. S. "Seythia," in N. 44° 20', W. 45° 56', passed several small icebergs.

10th.—S. S. "Seythia," in N. 42° 53', W. 48° 57', passed four small icebergs.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature of the United States and Canada for April, 1884, is exhibited on chart ii. by the dotted isothermal lines.

In the following table are shown the normal temperatures for April, the mean temperatures for April, 1884, and the departures from the normal, in the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for April, 1884.

Districts.	Average for April. Signal-Service ob- servations.		Comparison of April, 1884, with the average for several years.
	For sev- eral years.	For 1884.	
New England	43.3	44.2	0.9 above,
Middle Atlantic states.....	49.8	49.5	0.3 below.
South Atlantic states.....	61.3	59.9	1.4 below.
Florida peninsula	72.4	71.3	1.1 below.
Eastern Gulf states.....	65.3	63.3	2.0 below.
Western Gulf states.....	66.2	63.6	2.6 below.
Rio Grande valley.....	76.2	73.4	2.8 below.
Tennessee	59.2	57.6	1.6 below.
Ohio valley.....	53.7	51.5	2.2 below.
Lower lake region.....	43.2	42.2	1.0 below.
Upper lake region.....	39.5	38.9	0.6 below.
Extreme northwest.....	37.9	37.6	0.3 below.
Upper Mississippi valley.....	52.9	49.8	3.1 below.
Missouri valley.....	47.9	46.1	1.8 below.
Northern slope.....	42.0	40.4	1.6 below.
Middle slope.....	52.2	48.2	4.0 below.
Southern slope.....	63.7	58.3	5.4 below.
Southern plateau.....	58.8	55.4	3.4 below.
Northern plateau.....	48.7	51.5	2.8 above.
North Pacific coast region.....	49.9	52.2	2.3 above.
Middle Pacific coast region.....	57.1	56.2	0.9 below.
South Pacific coast region.....	61.6	60.7	0.9 below.
Mount Washington, N. H.	20.6	25.4	4.8 above.
Pike's Peak, Colo.....	13.0	8.5	4.5 below.
Salt Lake City, Utah	49.3	48.0	1.3 below.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

Stations reporting highest.		Stations reporting lowest.	
Key West, Florida.....	76.2	Pike's Peak, Colorado.....	8.5
Rio Grande City, Texas.....	75.1	Mount Washington, New Hampshire...	25.4
Brownsville, Texas.....	71.7	Marquette, Michigan.....	35.6
Sanford, Florida.....	69.7	Saint Vincent, Minnesota.....	35.6
Cedar Keys, Florida.....	69.0	Duluth, Minnesota.....	36.0
Jacksonville, Florida.....	68.7	Deadwood, Dakota.....	36.1
New Orleans, Louisiana.....	68.2	Cheyenne, Wyoming.....	36.2
Indianola, Texas.....	67.5	Escanaba, Michigan.....	36.3
Yuma, Arizona.....	67.4	Fort Maginnis, Montana.....	36.6
Galveston, Texas.....	67.2	Alpena, Michigan.....	37.3
Pensacola, Florida.....	66.3	Mackinaw City, Michigan.....	37.3
Mobile, Alabama.....	66.2	Bismarck, Dakota.....	38.7
Savannah, Georgia.....	65.3	Fort Buford, Dakota.....	38.9
Vicksburg, Mississippi.....	63.7	Moorhead, Minnesota.....	38.9

A comparison of the mean temperature of April, 1884, with the normal shows the month to have been colder than the average for April in all districts except in the north Pacific coast region, northern plateau, and in New England. In the north Pacific coast region and northern plateau the mean temperatures were 2° 3 and 2° 8 above the normal respectively; in New England the mean temperature was 0° 9 above the normal. The districts of greatest departures below the normal were the upper Mississippi valley, southern plateau, and the middle and southern slopes, where the departures ranged from 3° 1 to 5° 4. In the middle Atlantic states, lake region, extreme northwest, and in California the departures below the

normal varied from $0^{\circ}.3$ to 1° ; in the remaining districts the deficiencies ranged from $1^{\circ}.1$ to $2^{\circ}.6$. On the summit of Pike's Peak, Colorado, the mean temperature was $4^{\circ}.5$ below the April average of the ten preceding years. On the summit of Mount Washington, New Hampshire, the mean temperature was $4^{\circ}.8$ higher than the April average of the last thirteen years.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for April, 1884. The following notes in connection with this subject are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: mean temperature, $56^{\circ}.7$, is $5^{\circ}.6$ below the April average of the two preceding years.

Dakota.—Webster, Day county: mean temperature, $29^{\circ}.8$, is $7^{\circ}.2$ below the mean for April, 1883.

Illinois.—Collinsville, Madison county: mean temperature, $51^{\circ}.8$, is below the normal of forty-seven years. During that period lower mean temperatures, for April, occurred in eight years.

Anna, Union county: mean temperature, $54^{\circ}.7$, is $2^{\circ}.1$ below the April average of the last nine years.

Riley, McHenry county: mean temperature, $43^{\circ}.7$, is $0^{\circ}.6$ below the April average of the last twenty-three years.

Mattoon, Coles county: mean temperature, $51^{\circ}.0$, is $2^{\circ}.8$ below the April average of the last five years.

Indiana.—Logansport, Cass county: mean temperature, $48^{\circ}.9$, is $4^{\circ}.5$ below the April average of a period of twenty-five years.

Wabash, Wabash county: mean temperature, $47^{\circ}.9$, is $2^{\circ}.4$ below the April average of the last seven years.

Kansas.—Lawrence, Douglas county: mean temperature, $50^{\circ}.4$, is $3^{\circ}.8$ below the April average of seventeen years. The maximum temperature, $76^{\circ}.5$, is the lowest April maximum for the same period.

Wellington, Sumner county: mean temperature, $50^{\circ}.7$, is $5^{\circ}.8$ below the April average of the last six years.

Independence, Montgomery county: mean temperature, $52^{\circ}.5$, is $4^{\circ}.9$ below the April average of the last thirteen years.

Maine.—Gardiner, Kennebec county: mean temperature, $43^{\circ}.05$, is $1^{\circ}.7$ above the April average of a period of forty-eight years.

Maryland.—Sandy Springs, Montgomery county: mean temperature, $48^{\circ}.9$, is 2° below the April average of the last sixteen years.

Fallston, Harford county: mean temperature, $48^{\circ}.0$, is $1^{\circ}.6$ below the April average of the last thirteen years.

Missouri.—Saint Louis: mean temperature 53° , is 3° below the normal of a period of forty-seven years.

Michigan.—Thornville, Lapeer county: mean temperature, $44^{\circ}.1$, is about $1^{\circ}.5$ below the April normal.

New York.—North Volney, Oswego county: mean temperature, $40^{\circ}.4$, is $0^{\circ}.7$ below the average of the last seventeen years.

Palermo, Oswego county: mean temperature, $38^{\circ}.3$, is $2^{\circ}.9$ below the April average of the last thirty years. The highest April mean temperature of that period, $50^{\circ}.0$, occurred in 1878; the lowest, $32^{\circ}.3$, occurred in 1874.

Ohio.—Wauseon, Fulton county: mean temperature, $44^{\circ}.9$, is $1^{\circ}.3$ below the April average of the last fourteen years. The highest April mean temperature of that period, $54^{\circ}.8$, occurred in 1878; the lowest, $41^{\circ}.2$, occurred in 1881. The April extremes are: maximum 87° , in 1872; minimum $5^{\circ}.2$, in 1881.

Texas.—New Ulm, Austin county: mean temperature, $68^{\circ}.3$, is $3^{\circ}.4$ below the April average of the last twelve years.

Vermont.—Woodstock, Windsor county: mean temperature, $42^{\circ}.0$, is $2^{\circ}.6$ above the April average of the last seventeen years. The highest April mean of that period, $48^{\circ}.5$, occurred in 1878; the lowest, $32^{\circ}.5$, occurred in 1874.

Virginia.—Wytheville, Wythe county: mean temperature, $49^{\circ}.05$, is $2^{\circ}.9$ below the mean of a period of twenty years.

Variety Mills, Nelson county: mean temperature, $52^{\circ}.1$, is $2^{\circ}.1$ below the April average of the last seven years.

Table of maximum and minimum temperatures for April, 1884.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama	Mobile	86	43	Calera	94	28
Do	Montgomery	85	43	Evergreen	91	36
Arizona	Phoenix	96	33	Fort McDowell	92	37
Do	Prescott	71	18	Fort Lowell	91	34
Arkansas	Fort Smith	88	35	Newport	89	32
Do	Little Rock	85	36	Lead Hill	87	28
California	Los Angeles	80	42	Mammoth Tank	101	52
Do	Fort Bidwell	75	26	Boca	55	29
Colorado	West Las Animas	79	22	Fort Lyon	80	23
Do	Pike's Peak	33	— 7	Gunnison	58	12
Connecticut	New London	67	29	Southington	70	14
Do	New Haven	66	29			
Dakota	Fort Buford	76	12	Fort Yates	79	19
Do	Deadwood	62	13	Fort Pembina	66	9
Delaware	Del. Breakwater	70	35			
District of Columbia	Washington City	82	32	Rock Creek Bridge	83	33
Florida	Cedar Keys	89	51	Limons	95	47
Do	Pensacola	83	45	Fort Barrancas	86	43
Georgia	Augusta	88	40	Athens	93	32
Do	Atlanta	82	35	Smithville	92	15
Idaho	Coeur d'Alene	78	22	Fort Lapwai	80	31
Do	Lewiston	77	35			
Illinois	Springfield	80	32	Centralla	89	32
Do	Chicago	77	31	Monmouth	80	24
Indiana	Indianapolis	80	31	Logansport	88	26
Do				Grimm Station	79	25
Indian Territory	Cantonment	86	31			
Iowa	Dubuque	81	27	Guttenberg	86	26
Do	Davenport	79	24	Monticello	80	18
Kansas	Dodge City	80	26	Wellington	91	27
Do	Leavenworth	76	29	Westmoreland	80	21
Kentucky	Louisville	83	37	Frankfort	83	25
Louisiana	Shreveport	86	30	Cheney	87	40
Do	New Orleans	82	50	Coushatta	83	36
Maine	Portland	68	29	Orono	66	24
Do	Eastport	57	28	Gardiner	66	24
Maryland	Baltimore	80	34	Woodstock	80	28
Do	Ocean City	73	27	Sandy Springs	78	30
Massachusetts	Boston	62	29	Somerset	76	26
Do	Provincetown	60	29	Princeton	83	26
Michigan	Grand Haven	72	28	Mottville	81	28
Do	Marquette	69	18	Traverse City	75	17
Minnesota	Saint Paul	72	22	Hastings	74	19
Do	Moorhead	68	17	Northfield	71	18
Mississippi	Vicksburg	85	44	Meridian	89	37
Do				Aberdeen	85	36
Missouri	Saint Louis	83	34	Booneville	84	29
Do				Centerville	84	21
Montana	Fort Custer	74	18	Fort Keogh	78	12
Do	Fort Assinaboine	73	16	Fort Assinaboine	75	12
Nebraska	Omaha	75	25	Red Willow	83	26
Do	North Platte	70	25	Genoa	77	22
Nevada				Golconda	80	37
Do				Wells	62	22
New Hampshire	Mount Washington	45	2			
New Jersey	Atlantic City	67	30	South Orange	76	32
Do	Little Egg Harbor	66	30	Vineland	74	28
New Mexico	Fort Craig	84	30			
New York	Oswego	78	29	North Volney	74	26
Do	Buffalo	72	26	Madison Barracks	73	12
North Carolina	Scott's Hill	86	32	Wadesborough	88	30
Do	Smithville	86	38	Salisbury	86	21
Ohio	Cincinnati	80	35	Jacksonburg	89	26
Do	Cleveland	76	27	Wauseon	79	22
Oregon	Portland	80	40	Albany	80	40
Do	Linkville	69	10	Klamath Agency	78	21
Pennsylvania	Pittsburg	78	30	Leetsdale	77	22
Do	Erie	76	27	Troy	68	20
Rhode Island	Narragansett Pier	62	26			
Do	Point Judith	59	21			
South Carolina	Charleston	80	44	Saint George's	90	31
Do				Saint Matthew's	90	36
Tennessee	Knoxville	86	31	Milan	85	39
Do	Chattanooga	84	34	Dyersburg	86	31
Texas	Rio Grande City	102	45	Cleburne	90	32
Do	Fort Elliott	86	28	Weatherford	88	25
Utah	Salt Lake City	70	34	Ogden	82	34
Do				Nephi	68	25
Vermont				Woodstock	75	17
Do				Dorset	71	12
Virginia	Lynchburg	83	33	Variety Mills	82	27
Do	Fort Myer	80	30	Wytheville	81	26
Washington Territory	Dayton	78	32	Bainbridge Island	78	38
Do	Pysht	69	31	Fort Spokane	77	39
West Virginia				Helvetia	78	25
Wisconsin	Milwaukee	79	20	Nellville	69	18
Do	La Crosse	75	28	Evansville	80	30
Wyoming	Cheyenne	70	18	Fort Fred Steele	68	12

Johnsontown, Northampton county: mean temperature, $52^{\circ}.6$, is, with the exception of that for 1875, the lowest April mean temperature that has occurred during the last fifteen years.

West Virginia.—Helvetia, Randolph county: mean temperature, $46^{\circ}.4$, is $2^{\circ}.5$ below the April average of the last eight years.

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature were greatest in northern

Idaho, northern and eastern Montana, in Arizona, and from New Mexico and western Texas northward to British America, where they exceeded 50°. They were least on the Pacific and Gulf coasts, and on the Atlantic coast from northern North Carolina to New England, where they varied from 21° to 40°.

Monthly ranges of 55° or more occurred at the following stations: Cantonment, Indian Territory, Davenport, Iowa, Fort Bennett, Dakota, Fort Verde, Arizona, 55°; Cœur d'Alene,

Idaho, Fort Custer, Montana, and North Platte, Nebraska, 56°; El Paso, Texas, Fort Assinaboine, Montana, Rio Grande City, Texas, and West Las Animas, Colorado, 57°; Fort McDowell, Arizona, and Fort Elliott, Texas, 58°; Linkville, Oregon, 59°; Fort Concho, Texas, 60°; Fort Stockton, Texas, 61°; Fort Buford, Dakota, 66°.

Stations reporting monthly ranges of 35° or less, are as follows: Boise City, Idaho, Delaware Breakwater, Delaware,

Table of comparative maximum temperatures for the month of April.

State or Territory.	Maximum for April, 1884, Signal Service.		Maximum since Signal-Service stations were opened—3 to 13 years.			Highest from any other source.			
	Station.	Temperature.	Station.	Temperature.	Year.	Place.	Temperature.	Year.	Length of record.
Alabama	Mobile	86	Mobile	90	1881	Mount Vernon Arsenal	95		Years.
Do	Montgomery	85	Montgomery	90	1880	Huntsville	86		34
Arizona	Phoenix	90	Yuma	105	1876	Fort Lowell	109	1879	9
Do	Yuma	95	Phoenix	105	1881	Fort McDowell	100	1879	12
Arkansas	Fort Smith	88	Little Rock	94	1880	Fort Smith	96		14
Do	Little Rock	85	Fort Smith	88	1883	Mount Ida	95	1880	21
California	Red Bluff	77	Campo	94	1876	Fort Yuma	106		8
Do	Fort Bidwell	75	Los Angeles	94	1881	Fort Miller	101		31
Colorado	West Las Animas	79	Denver	83	1874	Fort Lyon	98		13
Do	Denver	70	West Las Animas	83	1882	Fort Garland	80		21
Connecticut	New Haven	67	New Haven	75	1880	New Haven	85		22
Do	New London	66	New London	74	1880	Middletown	85		86
Dakota	Fort Buford	76	Fort Buford	92	1881	Fort Sully	98		11
Do	Fort Bennett	74	Fort Sully	93	1874	Fort Randall	95		17
Delaware	Delaware Breakwater	70	Delaware Breakwater	86	1880	Fort Delaware	85		23
District of Columbia	Washington City	82	Washington City	87	1873, 1881	Washington City	91		45
Florida	Cedar Keys	89	Jacksonville	91	1874, 1880	Okahumpka	99	1880	49
Do	Jacksonville	88	Key West	91	1881	Fort King	94		4
Georgia	Augusta	88	Augusta	90	1880	Augusta Arsenal	94		10
Do	Savannah	87	Savannah	89	1873	Savannah	94		50
Idaho	Lewiston	77	Lewiston	86	1880	Fort Lapwai	85		37
Illinois	Cairo	80	Cairo	84	1873	Rock Island Arsenal	89		19
Do	Springfield	80	Chicago	83	1873	Chicago	84		11
Indiana	Indianapolis	80	Indianapolis	83	1880	Vevay	97		38
Indian Territory	Cantonment	86	Fort Sill	96	1880	Fort Sill	97		14
Do			Fort Gibson	93	1881	Fort Gibson	95		19
Iowa	Dubuque	81	Des Moines	84	1879, 1880	Iowa City	90		47
Do	Keokuk	80	Dubuque	84	1879	Glenwood	92	1880	15
Kansas	Dodge City	80	Leavenworth	89	1880	Fort Leavenworth	102		2
Do	Leavenworth	76	Dodge City	92	1880	Fort Larned	96		52
Kentucky	Louisville	83	Louisville	87	1873, 1880	Newport Barracks	98		18
Louisiana	Shreveport	86	New Orleans	85	1879	Fort Jesup	98		30
Do	New Orleans	82	Shreveport	93	1880, 1882	Baton Rouge	96		23
Maine	Portland	68	Eastport	63	1877	Fort Preble	90		58
Do	Orono	57	Portland	78	1881	Gardiner	86		60
Maryland	Baltimore	80	Baltimore	84	1881	Fort Washington	93		34
Do	Ocean City	73	Ocean City	74	1883	Fort McHenry	89		38
Massachusetts	Boston	69	Boston	80	1881	Williamstown	87		44
Do	Provincetown	60	Springfield	79	1881	Watertown Arsenal	85		62
Michigan	Grand Haven	72	Fort Huron	79	1881	Fort Gratiot	94		8
Do	Detroit	70	Marquette	81	1877	Detroit	90		22
Minnesota	Saint Paul	72	Saint Paul	82	1879, 1882	Fort Ridgely	90		35
Do	Moorhead	68	Breckenridge	80	1880	Fort Snelling	88		11
Mississippi	Vicksburg	85	Vicksburg	90	1881	Columbus	86		61
Do						Fayette	89	1880	10
Missouri	Saint Louis	83	Saint Louis	87	1881	Jefferson Barracks	94		7
Do			Springfield	89	1882	Corning	94	1880	36
Montana	Fort Custer	74	Fort Custer	85	1881	Fort Shaw	93		7
Do	Fort Assinaboine	73	Fort Keogh	90	1881	Fort Benton	83		13
Nebraska	North Platte	70	North Platte	72	1880	Fort McPherson	96		5
Do	Omaha	75	Omaha	89	1880	Omaha	96		8
Nevada			Pioche	80	1879	Fort McDermitt	90	1881	3
Do			Winnemucca	79	1881	Camp Winfield Scott	86		16
New Hampshire	Mount Washington	45	Mount Washington	49	1877	Concord	88		4
New Jersey	Sandy Hook	67	Atlantic City	79	1878	Vineland	88	1881	8
Do	Atlantic City	67	Barnegat City	79	1880	Burnt Mills	88	1877	7
New Mexico	Fort Craig	84	Fort Craig	97	1879	Fort Craig	104		3
Do			La Mesilla	100	1879				25
New York	Oswego	78	New York City	81	1877	Fort Niagara	94		54
Do	Rochester	76	Albany	80	1881	Ithaca	98		30
North Carolina	Smithville	86	Wilmington	92	1873	Fort Johnson	88		57
Do	Scott's Hill	86	Charlotte	85	1880, 1881	Weldon	90	1879, 1880	8
Ohio	Cincinnati	80	Cincinnati	85	1873	Cincinnati	93		36
Do	Columbus	77	Columbus	83	1881	Marietta	90		53
Oregon	Roseburg	78	Umatilla	89	1880	Fort Dalles	90		15
Do	Portland	80	Portland	85	1880	Fort Haskins	90		8
Pennsylvania	Pittsburg	78	Pittsburg	88	1878	Philadelphia	88		120
Do	Erie	75	Philadelphia	82	1881	Carlisle Barracks	88		35
Rhode Island	Narragansett Pier	72	Newport	70	1877	Providence	82		35
South Carolina	Charleston	85	Charleston	86	1873	Charleston	88		105
Do						Fort Moultrie	89		38
Tennessee	Memphis	83	Memphis	87	73, 80, 81	Ashwood	89	1880	3
Do	Knoxville	86	Chattanooga	88	1880, 1882	Glenwood Cottage	89		11
Texas	Rio Grande City	102	Rio Grande City	109	1875	Fort Ringgold	114	1878	32
Do	Brownsville	93	Eagle Pass	105	1880	Fort McIntosh	108		27
Utah	Salt Lake City	70	Salt Lake City	83	1874	Kanab	88	1875	5
Do						Fort Crittenden	85		3
Vermont			Burlington	75	1881	Lunenburg	78		17
Virginia	Lynchburg	83	Sorfolk	89	1881	Accotink	96	1881	7
Do	Fort Myer	80	Lynchburg	91.5	1873	Fortress Monroe	91		55
Washington Territory	Olympia	76	Olympia	82	1880	Fort Walla Walla	95		14
Do	Dayton	78	Dayton	91	1880	Fort Vancouver	82		19
West Virginia			Morgantown	89	1878	Wellsburg	88	1879	2
Wisconsin	Milwaukee	79	La Crosse	83	1879	Fort Crawford	91		26
Do	La Crosse	75	Madison	82	1879	Fort Howard	87		30
Wyoming	Cheyenne	70	Cheyenne	80	1874	Fort Laramie	89		27

Duluth, Minnesota, and Kitty Hawk, North Carolina, 35°; Cedar Keys, Florida, Fort Macon, North Carolina, and Sacramento, California, 34°; Galveston, Texas, and Sandy Hook, New Jersey, 33°; Cape May, New Jersey, and New Orleans, Louisiana, 32°; Provincetown, Massachusetts, 31°; Barnegat City, New Jersey, and Pike's Peak, Colorado, 30°; Block Island, Rhode Island, and Eastport, Maine, 29°; Hatteras, North Carolina, 28°; Willcox, Arizona, 27°; San Diego and San Francisco, California, 24°; Key West, Florida, 23°; Tatoosh Island, Washington Territory, 21°.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges varied in the several districts as follows:

New England.—From 20° at Block Island, Rhode Island, on the 30th, to 29° at Boston, Massachusetts, on the 23d.

Middle Atlantic states.—From 18° at Cape May, New Jersey, on the 14th, to 34° at New York City on the 30th.

South Atlantic states.—From 22° at Hatteras and Fort Macon, North Carolina, on the 1st and 26th, respectively, to 30° at Augusta, Georgia, on the 27th.

Florida peninsula.—From 14° at Key West, on the 11th, to 26° at Sanford, on the 13th.

East Gulf states.—From 21° at New Orleans, Louisiana, on the 12th, to 30° at Montgomery, Alabama, on the 10th.

West Gulf states.—From 17° at Galveston, Texas, on the 22d, to 36° at Fort Smith, Arkansas, on the 9th.

Rio Grande valley.—From 29° at Brownsville, Texas, on the 15th, to 38° at Rio Grande City, Texas, on the 20th.

Tennessee.—From 28° at Nashville, on the 2d, to 30° at Memphis, on the 13th.

Ohio valley.—From 24° at Cincinnati, Ohio, and Indianapolis, Indiana, on the 2d and 29th, respectively, to 35° at Pittsburgh, Pennsylvania, on the 30th.

Lower lake region.—From 24° at Toledo, Ohio, on the 14th, to 35° at Cleveland, Ohio, on the 30th.

Upper lake region.—From 24° at Duluth, Minnesota, on the 22d, to 36° at Milwaukee, Wisconsin, on the 30th.

Extreme northwest.—From 31° at Bismarek, Dakota, on the 24th, to 36° at Fort Buford, Dakota, on the 24th.

Upper Mississippi valley.—From 23° at Saint Louis, Missouri, and at Cairo and Springfield, Illinois, on the 1st, 2d, and 29th, respectively, to 34° at Davenport, Iowa, on the 28th.

Missouri valley.—From 27° at Omaha, Nebraska, on the 17th, to 38° at Fort Bennett, Dakota, on the 3d.

Northern slope.—From 21° at North Platte, Nebraska, on the 27th, to 39° at Fort Shaw, Montana, on the 8th.

Middle slope.—From 17° on the summit of Pike's Peak, Colorado, on the 15th, and 32° at Denver, Colorado, on the 23d, to 46° at West Las Animas, Colorado, on the 9th.

Southern slope.—From 36° at Fort Davis, Texas, on the 25th, to 44° at Fort Stockton, Texas, on the 24th.

Southern plateau.—From 28° at Fort Grant, Arizona, on the 6th, to 46° at El Paso, on the 22d.

Middle plateau.—27° at Salt Lake City, Utah, on the 23d.

Northern plateau.—From 28° at Boise City, Idaho, on the 18th and 19th, to 40° at Dayton, Washington Territory, on the 7th.

North Pacific coast region.—From 24° at Fort Canby, Washington Territory, on the 8th, to 36° at Olympia, Washington Territory, on the 7th.

Middle Pacific coast region.—From 15° at San Francisco, California, on the 20th, to 29° at Red Bluff, California, on the 7th.

South Pacific coast region.—From 18° at San Diego, California, on the 4th, to 37° at Yuma, Arizona, on the 6th.

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st to 9th, 8th, 11th to 14th, 21st to 24th, 27th, 28th, 30th.

Middle Atlantic states.—1st to 15th, 17th to 23d, 25th to 28th, 30th.

South Atlantic states.—3d, 4th, 5th, 7th, 9th to 12th, 17th, 25th to 27th.

Florida.—Cedar Keys and Archer, 10th.

Eastern Gulf states.—Mobile, Alabama, 24th.

Western Gulf states.—Arkansas: Little Rock, 9th; Fort Smith, 9th, 23d; Mount Ida and Lead Hill, 3d, 9th, 24th; Springfield, 3d, 8th, 9th, 24th. Louisiana: Shreveport, 9th; Liberty Hill, 3d, 8th, 9th, 23d, 24th. Texas: Cleburne, 9th, 23d; Clarksville, 9th, 23d, 24th; Barnesville, 10th, 23d; Indianola, 22d; Palestine, 23d.

Tennessee.—3d, 8th to 11th, 17th, 25th.

Ohio valley.—2d to 13th, 17th, 18th, 25th, 26th.

Lower lake region.—1st to 14th, 17th to 19th, 21st to 24th, 26th, 27th, 29th, 30th.

Upper lake region.—1st to 29th.

Extreme northwest.—1st to 12th, 14th to 24th, 26th to 30th.

Upper Mississippi valley.—1st to 12th, 16th, 17th, 19th to 25th, 28th, 29th.

Missouri valley.—1st to 13th, 15th, 16th, 19th to 25th, 27th, 28th.

Northern slope.—1st to 23d, 26th to 30th.

Middle slope.—1st to 10th, 12th, 13th, 16th to 27th, 29th, 30th.

Southern slope.—Fort Davis, Texas, 21st, 22d.

Southern plateau.—1st to 7th, 10th, 13th, 14th, 18th to 22d, 29th.

Middle plateau.—1st to 9th, 12th, 13th, 16th to 20th, 22d, 25th to 28th, 30th.

Northern plateau.—1st, 3d, 4th, 12th, 18th to 20th, 26th to 28th.

North Pacific coast region.—4th, 14th, 15th, 18th, 19th, 27th, 30th.

California.—Sacramento, 2d, 16th, 17th; Hydesville, 4th; Princeton, 28th.

The following instances of damage to vegetation by frosts, have been reported:

Denison, Texas.—Frost occurred in this vicinity on the morning of the 9th, causing considerable damage to early vegetables.

Savannah, Georgia.—The frost on the morning of the 10th, caused slight injury to vegetation in this community.

Cedar Keys, Florida.—On the morning the 10th, frost was reported from Rosewood, ten miles northeast of this station.

New River Inlet, North Carolina.—Crops in this vicinity were damaged by frost on the 12th.

Fort Davis, Texas.—A heavy frost occurred on the morning of the 21st, killing tender vegetation and damaging fruit trees.

Mobile, Alabama.—On the 24th, light frost occurred near this place and heavy frosts were reported from the central and northern portions of Mississippi and Alabama.

Thornville, Michigan, 30th.—The cold and dry weather of the month has materially injured the wheat crop.

ICE.

The formation of ice has been reported as follows:

Arkansas.—Lead Hill, 3d, 9th.

Illinois.—Edwardsville, 8th; Cairo, 11th.

Indiana.—Laconia, 8th.

Iowa.—Humbolt, 3d; Dubuque, 2d, 3d, 21st.

Maine.—Bangor, 11th, 14th, 15th; Portland, 22d.

Michigan.—Detroit, 1st, 3d.

Missouri.—Lexington, 8th.

Pennsylvania.—6th, 7th, 9th.

New York.—Albany, 22d; Buffalo, 29th.

Texas.—Fort Concho, 21st.

Tennessee.—Nashville, 9th.

Vermont.—Strafford, 22d, 23d, 24th, 26th.

Wisconsin.—La Crosse, 17th, 21st.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada for April, 1884, as determined from the reports from nearly eight hundred stations is exhibited on chart iii.

Table of excessive, and greatest and least monthly precipitation.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
Alabama.						
Jackson.....				7.27	Arizona.	
Scottsborough.....	14, 15	3.38		7.27	Casa Grande.....	0.00
Tusculum.....	14, 15	4.00		7.19	Pantano.....	0.00
Decatur.....	14, 15	4.02		7.13	San Simon.....	0.00
Birmingham.....	14, 15	5.50		6.87	Willcox.....	0.00
Morgan.....				6.50	Maricopa.....	0.00
Mobile.....	5, 6	2.01			Fort McDowell.....	0.00
Do.....	20, 21	2.51			Yuma.....	0.07
Montgomery.....	19, 20	2.01			Fort Lowell.....	0.08
Greenville.....	19, 20	2.05			Tucson.....	0.20
Arkansas.						
Prescott.....	18	11.06		18.32?	Texas Hill.....	0.23
Do.....	30	5.00			Phoenix.....	0.40
Texarkana.....	14, 15	2.10		10.96	Fort Grant.....	0.47
Do.....	18, 19	3.10			Maricopa.....	0.51
Do.....	28, 29, 30	4.09			Fort Thomas.....	0.72
Little Rock.....	14	2.99		10.24	San Carlos.....	0.85
Do.....	18, 19	3.19			California.	
Mount Ida.....	28	3.05		8.30	Napa.....	0.00
Newport.....	11, 12	3.21		7.65	White Water.....	0.00
Monticello.....	14	2.00			Bishop's Creek.....	0.05
Do.....	18, 19	2.25			Mammoth Tank.....	0.07
California.						
Summit.....				12.60	Daggett.....	0.10
Colfax.....				10.94	Fenner.....	0.13
Emigrant Gap.....				10.84	Keeler.....	0.20
Cisco.....				10.10	Indio.....	0.44
Auburn.....				8.02	Colorado.	
Alcatraz Island.....				7.34	Pike's Peak.....	0.43
Santa Cruz.....				6.78	Dakota.	
Angel Island.....	10	2.21		6.67	Fort Sully.....	0.14
Ione.....				6.51	Fort Yates.....	0.72
Hydesville.....				6.28	Florida.	
Knoxville.....				6.19	Key West.....	0.98
San Diego.....	9	2.00			Iowa.	
San Francisco.....	9, 10, 11	4.08			Davenport.....	0.77
Los Angeles.....	9, 10	2.32			Kansas.	
Oakland.....	12	3.37			Sherlock.....	0.33
Do.....	15	2.00			Louisiana.	
Colorado.						
Pueblo.....	7	2.25			Amite City.....	0.13
Dakota.						
Yankton.....	24, 25	2.00			Michigan.	
Fort Meade.....	27	4.32			Marshall.....	0.51
Fort Bennett.....	28, 29	2.15			Alpena.....	0.75
Florida.						
Fort Barrancas.....	5	2.60		6.95	Mackinaw City.....	0.99
Do.....	21	2.15			Minnesota.	
Cedar Keys.....	5, 6	2.35			Saint Vincent.....	0.80
Pensacola.....	5	2.00			Mississippi.	
Do.....	20, 21	2.10			Meridian.....	0.27
Georgia.						
Quitman.....	14, 15	4.28		10.26	Montana.	
Do.....	21	3.00			Fort Assinaboine.....	0.25
Cartersville.....	14, 15	5.26		7.60	Fort Shaw.....	0.59
Gainesville.....	14, 15	5.48		7.51	Fort Maginnis.....	0.62
Athens.....	15	2.60	3 hours.	6.09	Fort Custer.....	0.77
Newnan.....	14, 15	3.23		6.02	Nevada.	
Atlanta.....	14, 15	3.76			Hawthorne.....	0.18
Toccoa.....	14, 15	3.50			Reno.....	0.35
Griffin.....	14, 15	2.29			Hot Springs.....	0.44
Way Cross.....	15	2.40			Brown's.....	0.72
Augusta.....	14, 15	2.24			Beowawe.....	0.77
West Point.....	14, 15	2.20			New Jersey.	
Allapaha.....	21, 22	2.04			Barnegat City.....	0.97
Madison.....	15, 16	2.03			New Mexico.	
Forsyth.....	15	2.83			Fort Craig.....	0.03
Charlotte.....	21, 22	3.02			Deming.....	0.20
Fort Gaines.....	20, 21	2.77			Lordsburg.....	0.20
Indian Territory.						
Fort Reno.....	30	2.76			Fort Union.....	0.28
Kansas.						
Fort Scott.....	28	2.05		7.53	New York.	
West Leavenworth.....	17	2.00			Auburn.....	0.30
Do.....	18	2.50			Madison.....	0.54
Do.....	21	2.00			Palermo.....	0.68
Independence.....	30	2.30			Fort Niagara.....	0.71
Louisiana.						
Coushatta.....	19	2.91		6.74	North Volney.....	0.80
Shreveport.....	14	2.27		6.60	Oswego.....	0.88
Do.....	19, 20	2.08			Rochester.....	0.94
New Orleans.....	4, 5	2.99		6.48	Ohio.	
Minden.....	19, 20, 21	4.96		6.17	Canal Dover.....	0.64
Grand Coteau.....	4	3.81			Ruggles.....	0.85
Whiteville.....	5	4.13			Texas.	
Opelousas.....	5	3.06			Menard.....	0.20
Natchitoches.....	13	2.00			Brownsville.....	0.57
Maine.						
Eastport.....	16	2.27		6.83	El Paso.....	0.91
Gardiner.....	16	2.30		6.53	Fort Stockton.....	0.91
Portland.....	15, 16	3.90		6.12	Rio Grande City.....	0.93
Massachusetts.						
Provincetown.....	3	2.06		8.31	Utah.	
Michigan.						
Marquette.....	14, 15	2.39			Logan.....	0.20
Mississippi.						
Corinth.....	14	3.00		6.25	Vermont.	
Brookhaven.....	5, 6	2.19			Lunenburg.....	0.86
Missouri.						
Greenfield.....				6.50	Washington Territory.	
Pierce City.....	30	2.20			Ainsworth.....	0.67
North Carolina.						
Highlands.....	14	2.85			West Virginia.	
Do.....	21	2.00			Wellburg.....	0.90
Hatteras.....	15	2.31			Wyoming.	
					Fort Bridger.....	0.32
					Fort Fred Steele.....	0.96

Table of excessive, and greatest and least monthly precipitation.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
North Carolina—Cont'd.						
New-Berne	15	2.30			South Carolina.	
Salisbury	22	2.01			Greenville	14, 15 2.69
South Carolina.						
Do	21, 22	2.07			Do	21, 22 2.07
Spartanburg	14, 15	2.20			Chester	20, 21 2.60
Chester	20, 21	2.60			Aiken	14 2.40
Tennessee.						
Memphis	14	3.02			Do	18, 19 2.19
Do	18, 19	2.19		8.60	Grand Junction	14 2.91
Grand Junction	14	2.91		7.34	Do	18, 19 2.01
Do	18, 19	2.01			Brownsville	14 3.09
Brownsville	14	3.09		6.24	Ashwood	13 3.70
Ashwood	13	3.70		6.00	Chattanooga	14, 15 2.62
Chattanooga	14, 15	2.62			Milan	14 2.04
Milan	14	2.04			Do	21 2.13
Texas.						
Honey Grove				8.40	Texas.	
Austin				7.78	Do	
Palestine	18, 19	3.01		7.30	Do	
Barnesville	18	3.50		7.00	Do	
Galveston	4, 5	2.76			Do	
Do	11	1.96			Do	
Tyler	14	2.00			Do	
Dallas	18, 19	2.00			Do	
Concho	29	2.60			Do	
New Uln	11	2.09			Do	
Clarkeville	28	2.14			Do	
Utah.						
Nephi				6.30	Wisconsin.	
Franklin				6.30	Wisconsin.	

In the first column of the following table is shown the average precipitation for April in each of the various districts for several years, as determined from observations made at the Signal Service stations; in the second column are given the averages for April, 1884; and the third column shows the excess or deficiency of April, 1884, as compared with the average.

Average precipitation for April, 1884.

Districts.	Average for April.		Comparison of April, 1884, with the average for several years.
	Signal-Service observations.	For several years.	
	Inches.	Inches.	Inches.
New England	3.48	4.82	1.34 excess.
Middle Atlantic states	3.58	2.30	1.28 deficiency.
South Atlantic states	4.76	3.69	1.07 deficiency.
Florida peninsula	2.60	2.46	0.14 deficiency.
Eastern Gulf states	5.90	5.29	0.61 deficiency.
Western Gulf states	4.62	5.65	1.03 excess.
Rio Grande valley	0.74	0.75	0.01 excess.
Tennessee	5.53	5.62	0.09 excess.
Ohio valley	3.59	2.62	0.97 deficiency.
Lower lake region	2.32	1.31	0.91 deficiency.
Upper lake region	2.18	2.63	0.45 excess.
Extreme northwest	1.87	1.83	0.04 deficiency.
Upper Mississippi valley	3.01	2.58	0.43 deficiency.
Missouri valley	3.00	4.17	1.17 excess.
Northern slope	1.80	1.20	0.60 deficiency.
Middle slope	1.23	1.82	0.59 excess.
Southern slope	0.70	2.73	1.97 excess.
Southern plateau	0.44	0.96	0.52 excess.
Northern plateau	1.95	1.47	0.48 deficiency.
North Pacific coast region	3.08	3.55	0.47 excess.
Middle Pacific coast region	2.80	4.99	2.19 excess.
South Pacific coast region	1.04	2.16	1.12 excess.
Mount Washington, N. H.	4.36	3.29	1.07 deficiency.
Pike's Peak, Colo.	3.61	0.43	3.18 deficiency.
Salt Lake City, Utah	2.40	2.89	0.49 excess.

In the northern plateau, northern slope, upper Mississippi, and Ohio valleys, Tennessee, lower lake region, east Gulf states, and on the Atlantic coast south of New England the average precipitation for April was below the normal. In those districts the deficiencies varied from 0.21 to 0.97, except in the middle and south Atlantic states, where they were 1.28 and 1.07 respectively. In the extreme northwest and Rio Grande valley the monthly precipitation was normal. On the Pacific coast, in the western Gulf states, Missouri valley, middle, and southern slopes, and southern plateau the monthly precipitation was in excess of the average, the departures averaging about 0.50 in the north Pacific coast region, middle slope, and south-

ern plateau; and in the other districts named they ranged from 1.03 in the west Gulf states to 2.19 in the middle Pacific coast region.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation for April, 1884. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: monthly precipitation, 3.87, is 1.34 below the April average of the two preceding years.

California.—Mr. Elwood Cooper, of Santa Barbara, Santa Barbara county, furnishes the following table of rainfall data for that place, with the accompanying remarks:

Seasons.	Precipitation.		
	Before January 1.	After January 1.	Total for season.
1870-71.....	3.00	6.00	9.00
1871-72.....	8.50	7.38	15.88
1872-73.....	4.19	7.31	11.50
1873-74.....	5.75	9.75	15.50
1874-75.....	4.25	16.69	20.94
1875-76.....	6.75	15.88	22.63
1876-77.....	0.63	6.50	7.13
1877-78.....	5.75	27.25	33.00
1878-79.....	8.12	6.38	14.50
1879-80.....	6.37	21.94	28.31
1880-81.....	13.50	3.06	16.56
1881-82.....	3.56	10.04	14.50
1882-83.....	1.31	11.88	13.19
Sum.	71.68	150.95	222.64
Mean.	5.51	11.61	17.13
1883-84.....	3.81	29.25	33.06
Comparison of 1883-84 with average.....	- 1.70	+17.64	+15.93

The above table shows that less than one-third of the average winter precipitation occurs before January 1st, and more than two-thirds occur after that date. In six of the years covered by the above record the rainfall after March 1st was two inches; in one year it was one inch; in one year there was no rainfall after February; and in five years the rains extended into April and early May.

The annual precipitation for California, as shown by the Smithsonian charts, prepared under the direction of the late Professor Henry, does not indicate the favorable or unfavorable conditions for the production of crops, for the reason that it gives the annual rainfall from January 1st to December 31st, while the result depends upon the rainfall from October to April, that is, the autumn, winter and spring rains determine the success or failure of the crops. For example, during the winter of 1876-7 the rainfall after January 1st was 6.50, and in November and December of the same year it was 5.75, giving a total of 12.25, or a sufficient amount to insure a fair average crop, while in that year the crops were almost a total failure throughout the state. The rainy season of 1883-4 has differed from any of the preceding years. The rains began at the most favorable season—the last of October and in early December—3.81 inches falling before the close of the year. The people of California were never more apprehensive of an impending drought than during January, 1884. Business interests suffered seriously in consequence of the prevalence of this opinion. Many theories were published indicating that the year 1884 would be one of drought. Tables were deduced showing such a probability; decades of dry years coming at certain periods, of which this was to be one. Still there has never been a year in which so much rain has fallen after January 1st, as has been the case in this year. The precipitation for that part of the rainy season preceding January 1st, compared with the average of the corresponding season, shows a deficiency of 1.70, while that of the succeeding months exhibits the unusually large excess of 17.64, and the total amount exceeds the largest precipitation of any previous year of the record.

Illinois.—Riley, Montgomery county: monthly precipitation, 2.85, is 0.21 in excess of the April average of the last twenty-three years.

Mattoon, Coles county: monthly precipitation, 4.16, is 0.29 above the April average of the last five years.

Anna, Union county: monthly precipitation, 3.80, is 0.80 below the April average of the last nine years.

Indiana.—Wabash, Wabash county: monthly precipitation, 2.34, is 0.37 below the April average of the last seven years.

Logansport, Cass county: monthly precipitation, 2.19, is 1.23 below the April average of a period of twenty-five years.

Kansas.—Lawrence, Douglas county: monthly precipitation, 5.62, is 2.63 in excess of the April average of the last sixteen years. The precipitation for the first four months of 1884 is 10.76, or 3.06 above the average for the corresponding period of sixteen years.

Wellington, Sumner county: monthly precipitation, 3.67, is 1.41 above the April average of the last six years.

Independence, Montgomery county: monthly precipitation, 4.85, is 1.46 above the April average of the last twelve years.

Maine.—Gardiner, Kennebec county: monthly precipitation, 6.53, is 3.10 in excess of the April average for a period of forty-eight years. The total precipitation for the first four months of 1884, is 24.62, or 10.54 above the average of the corresponding months of the last forty-eight years.

Maryland.—Fallston, Harford county: monthly precipitation, 1.94, is 1.42 below the April average of the last thirteen years.

Missouri.—Saint Louis: monthly precipitation, 3.92, is about the normal amount for April.

New York.—North Volney, Oswego county: monthly precipitation, 0.80, is 1.29 below the April average of a period twelve years.

Palermo, Oswego county: monthly precipitation, 0.68, is 1.90 below the April average of the last thirty years, and is the smallest April precipitation of that period; the largest, 7.00, occurred in 1859.

Ohio.—Wauseon, Fulton county: monthly precipitation, 1.42, is 1.04 below the April average of a period of eleven years. The largest April precipitation, 4.81, occurred in 1880; the smallest, 1.31, occurred in 1872.

Texas.—New Ulm, Austin county: monthly precipitation, 4.68, is 0.53 above the April average of a period of twelve years.

Vermont.—Woodstock, Windsor county: monthly precipitation, 2.31, is 0.15 below the average of the last fifteen years.

Virginia.—Wytheville, Wythe county: monthly precipitation, 2.65, is 0.96 below the April average of a period of twenty years.

Variety Mills, Nelson county: monthly precipitation, 2.21, is 0.79 below the April average of the last five years.

West Virginia.—Helvetia, Randolph county: monthly precipitation, 2.70, is 1.33 below the April average of the last eight years.

Table of rainy and cloudy days, relative humidity, and dew-point for April, 1884.

Districts.	Rainy days.	Cloudy days.	Rel. humidity, °	Dew-point.
			Percentages.	°
New England.....	From 12 to 23	From 11 to 17	From 69.4 to 83.9	From 34.0 to 38.1
Middle Atlantic states.....	" 6 " 12	" 6 " 13	" 57.8 " 81.5	" 34.3 " 42.9
South Atlantic states.....	" 7 " 13	" 3 " 10	" 59.3 " 76.4	" 41.0 " 55.7
Florida peninsula.....	" 3 " 7	" 0 " 5	" 68.0 " 71.7	" 57.5 " 64.6
East Gulf states.....	" 6 " 12	" 5 " 11	" 63.9 " 72.5	" 49.2 " 56.6
West Gulf states.....	" 7 " 14	" 5 " 16	" 66.5 " 81.5	" 44.5 " 61.0
Rio Grande valley.....	" 4 " 6	" 3 " 11	" 61.4 " 76.8	" 37.9 " 62.7
Ohio valley.....	" 11 " 17	" 11 " 17	" 59.1 " 69.8	" 35.1 " 45.5
Tennessee.....	" 11 " 16	" 11 " 14	" 63.8 " 69.8	" 44.6 " 45.5
Lower lake region.....	" 7 " 14	" 9 " 15	" 62.7 " 76.7	" 30.9 " 33.8
Upper lake region.....	" 5 " 13	" 6 " 13	" 64.6 " 75.3	" 25.4 " 33.3
Extreme northwest.....	" 8 " 10	" 8 " 12	" 69.8 " 78.3	" 28.8 " 38.2
Upper Mississippi valley.....	" 8 " 16	" 10 " 15	" 58.0 " 68.1	" 31.2 " 38.5
Missouri valley.....	" 9 " 15	" 10 " 14	" 67.3 " 73.7	" 31.2 " 39.1
Northern slope.....	" 7 " 16	" 2 " 10	" 47.8 " 75.5	" 18.1 " 34.0
Middle slope.....	" 2 " 13	" 2 " 11	" 52.3 " 79.6	" 25.5 " 31.9
Southern slope.....	" 4 " 10	" 3 " 5	" 51.4 " 61.1	" 34.4 " 43.7
Southern plateau.....	" 0 " 10	" 1 " 5	" 31.9 " 64.3	" 23.8 " 34.1
Northern plateau.....	" 7 " 14	" 1 " 7	" 60.7 " 69.2	" 37.3 " 40.1
North Pacific coast region.....	" 12 " 18	" 7 " 18	" 68.7 " 85.1	" 42.7 " 45.1
Middle Pacific coast region.....	" 9 " 12	" 6 " 10	" 72.6 " 79.1	" 46.6 " 48.4
South Pacific coast region.....	" 1 " 10	" 2 " 6	" 44.8 " 79.7	" 42.0 " 51.0
Mt. Washington, N. H.....	Twelve	Three	91.8	23.3
Pike's Peak, Colo.....	Twenty-three	Eight	79.6	3.4

* Relative humidity corrected for altitude.

SNOW.

Snow fell in the various districts as follows:

New England.—1st to 7th, 9th to 11th, 18th, 21st to 23d, 29th. On Mount Washington, New Hampshire, snow fell on the 2d, 3d, 4th, 10th 11th, 12th, 16th to 19th, 25th, 29th.

Middle Atlantic states.—1st to 6th, 8th, 9th, 10th.

Western Gulf states.—Lead Hill, Arkansas, 8th; Fayetteville, Arkansas, 22d.

Ohio valley.—2d, 3d, 8th, 9th, 10th.
Lower lake region.—1st to 11th, 16th, 17th, 21st, 24th, 29th.
Upper lake region.—1st, 2d, 6th to 10th, 15th to 18th, 20th, 27th, 28th, 29th.
Extreme northwest.—4th to 9th, 15th, 18th, 27th to 30th.
Upper Mississippi valley.—1st, 2d, 6th to 9th, 20th, 22d.
Missouri valley.—1st, 5th to 9th, 19th to 22d.
Northern slope.—1st, 4th to 11th, 13th, 14th, 15th, 18th, 19th, 24th to 30th.
Middle slope.—1st, 2d, 4th, 6th to 9th, 11th, 12th, 13th, 18th to 21st, 26th, 30th.
 On Pike's Peak, Colorado, snow occurred on the 1st to 7th, 11th to 15th, 17th, 23d, 25th, 27th, 28th.
Southern slope.—Fort Davis, Texas, 20th; Fort Concho, Texas, 20th and 30th.
Southern plateau.—10th, 11th, 12th, 17th, 18th, 26th to 30th.
Middle plateau.—1st, 2d, 4th, 5th, 6th, 10th to 18th, 21st, 23d to 30th.
Northern plateau.—2d, 3d, 4th, 11th to 17th, 24th to 27th, 30th.
 Snow storms of unusual severity occurred during the month as follows:

Hartford, Connecticut.—One of the heaviest snow-falls of the winter occurred on the 2d, the snow falling to a depth of one foot.

Dayton, Ohio.—The snow storm of the 8th equalled in severity any that occurred during the winter, and was the heaviest ever experienced here at so late a date.

Mount Carmel, Northumberland county, Pennsylvania.—A heavy snow storm prevailed throughout the coal region on the 9th, the snow falling to a depth of seven inches. Many of the collieries suspended work and railroad travel was much impeded.

Wilkesbarre, Pennsylvania.—A heavy snow storm prevailed on the 9th; at Glen Summit the snow fell to a depth of four-teen inches, and at Hazleton to nineteen inches.

Fort Keogh, Montana.—The severest snow storm of the season prevailed on the 29th, the snow falling to a depth of eight inches.

Reports from Durango, La Plata county, Col., on the 16th, stated that the snow blockade, which had continued for seventy-six days preceding that date, had been raised, and it was expected that trains would be able to resume their regular trips on the 17th; a train arrived on the 16th, which was the first since February 3d. The report also stated that this was the most protracted snow blockade ever experienced in western Colorado, and that the damage resulting to business interests was incalculable. Great damage is expected to result from the melting of the snow, which covered the country from six to eight feet deep.

LARGEST MONTHLY SNOW-FALLS.

[Expressed in inches and tenths.]

The following are the largest monthly snow-falls reported from the various states and territories during the month:

California.—Summit, 126; Cisco, 98; Emigrant Gap, 48; Truckee, 37; Alta, 26; Boca, 19; Colfax, 7.

Colorado.—Denver, 18; Pike's Peak, 4.3; Pueblo, 3.2.

Connecticut.—Hartford, 10.5; Southington, 10; Bethel, 8.

Dakota.—Morrison, 9; Bismarck, 4.

Illinois.—Riley, 10.5; Sycamore, 10.5.

Indiana.—Griffin Station, 3.8; Logansport, 3.2; Wabash, 3.

Iowa.—Manchester, 5.5; Ottumwa, 4.5; Independence, 3; Monticello, 3.

Kansas.—Fort Scott, 18; Lawrence, 6; Wyandotte, 5; Allison, 3.

Maine.—Eastport, 5.3; Gardiner, 3.

Maryland.—Fallston, 7.5.

Massachusetts.—Princeton, 26; Worcester, 23.7; Westborough, 12; Amherst, 10; Milton, 10; Boston, 9.5; Taunton, 5; Fall River, 4.

Michigan.—Marquette, 12; Traverse City, 9; Mottville, 7; Hillsdale, 6.3; Grand Haven, 4.2; Northport, 4; Escanaba, 3.8.

Minnesota.—Chester, 7; Minneapolis, 3.8.

Montana.—Helena, 8.9; Fort Maginnis, 6; Fort Custer, 4.5.

Nebraska.—Genoa, 4; Stockham, 3.

Nevada.—Halleck, 18; Toano, 17.8; Otego, 17.5; Battle Mountain, 10.5; Antrim, 10; Wells, 8; Tecoma, 7.1; Carson City, 7; Elko, 7; Palisade, 5; Winnemucca, 5; Hot Springs, 4; Reno, 3.5; Carlin, 3.

New Jersey.—Caldwell, 3.

New Hampshire.—Mount Washington, 32.8.

New York.—Dannemora, 17.9; Albany, 11; Mountainville, 9; Menand Station (near Albany), 8.8; Rochester, 6; White Plains, 4; Ithaca, 3.9; Humphrey, 3.

Ohio.—Cleveland, 8; Sandusky, 6; Wauseon, 4.9; Toledo, 4.

Oregon.—Lakeview, 4.

Pennsylvania.—Drifton, 23.9; Dyberry, 18; Grampian Hills, 8; Erie, 4.3.

Utah.—Nephi, 6.5; Terrace, 4.

Vermont.—Dorset, 9; Strafford, 9; Woodstock, 6; Newport, 5.8; Lunenburg, 4.

Virginia.—Norfolk, 8.

West Virginia.—Helvetia, 3.8.

Wisconsin.—Ripon, 10.1; Franklin, 9; Embarras, 8.2; Manitowoc, 6.1; Milwaukee, 5.8; Sussex, 5; Madison, 4.2; Beloit, 3.5; Neilsville, 3.5; Evansville, 3.

Wyoming Territory.—Fort Bridger, 5.8.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

Colorado.—Pike's Peak, 42; Denver, 10.

Dakota.—Deadwood, 5.

New Hampshire.—Mount Washington, 12.

Vermont.—Dorset, trace in mountains; Strafford, only in places.

SNOW FROM A CLOUDLESS SKY.

Portland, Maine.—A few flakes of snow fell from a cloudless sky at 1.45 a. m. of the 23d.

SLEET.

Sleet fell in the several states and territories during the month, as follows:

Connecticut.—New Haven, 2d.

Dakota.—Huron, 7th; Fort Sisseton, 28th.

Idaho.—Boisé City, 14th.

Illinois.—Chicago, 20th; Springfield, 22d.

Indiana.—Logansport, 22d.

Iowa.—Independence, 1st; Davenport, 1st, 2d, 7th, 20th.

Kansas.—Fort Scott, 11th.

Maine.—Eastport, 15th.

Massachusetts.—Provincetown, 4th.

Michigan.—Kalamazoo, 7th; Marquette, 14th, 15th; Escanaba, 1st, 15th, 16th; Alpena, 20th.

Missouri.—Pierce City, 11th; Saint Louis, 21st.

Montana.—Fort Ellis, 14th.

Nebraska.—Omaha, 19th.

New Hampshire.—Mount Washington, 17th, 18th.

New York.—Buffalo, 1st, 2d; Oswego, 2d, 3d, 4th, 5th.

New Mexico.—Fort Union, 4th.

Ohio.—Cincinnati, 2d; Wauseon, 2d; Portsmouth, 8th; North Lewisburg, 21st; Columbus, 22d; Jacksonburg, 22d.

Rhode Island.—Narragansett Pier, 2d; Block Island, 2d.

Texas.—Indianola, 20th; Fort Concho, 20th.

Utah.—Salt Lake City, 26th.

Virginia.—Fort Myer, 22d.

Wisconsin.—Milwaukee, 7th.

HAIL.

Manhattan, Riley county, Kansas.—A hail storm occurred on the 18th. No serious damage was done at this place, but at a point five miles northward considerable window-glass was broken by the hail stones, which were from two to two and one-half inches in diameter.

Fort Stockton, Pecos county, Texas.—On the 18th a heavy hail storm occurred in this county on the Pecos river about forty miles north-northwest of Fort Stockton. The storm began shortly after 10 p. m., the hail stones being very large and fell with such force as to cause serious injury to stock.

Fairbury, Jefferson county, Nebraska.—On the 28th, a severe hail storm occurred twelve miles northwest of this place, the hail stones covering the ground to a depth of one and one-half inches.

The dates on which hail fell in the various states and territories are as follows:

Alabama.—Green Springs, 14th.

Arizona.—Prescott, 10th; Wickenburg, 11th; Maricopa and Fort McDowell, 29th; Fort Bowie, 28th; Fort Grant, 30th.

Arkansas.—Little Rock, 13th, 18th.

California.—Red Bluff, 26th; San Diego, 27th.

Colorado.—Grand Junction, 28th; Fort Lyon, 30th.

Dakota.—Fort Yates, 29th.

District of Columbia.—Washington, 1st, 2d, 22d.

Georgia.—Atlanta and Augusta, 15th.

Illinois.—Chicago, 1st; Rockford, 9th; Riley, 14th.

Indiana.—Sunman, 1st; Terre Haute, 1st, 22d; Vevay, 2d, 6th, 8th; Jeffersonville, 15th; Griffin station, 27th.

Iowa.—Dubuque, Humboldt and Monticello, 1st; Independence, 1st, 7th, 14th; Indianola and Ottumwa, 14th; Des Moines, 26th.

Kansas.—Emporia, 3d, 4th, 7th, 8th, 9th, 10th, 16th, 23d, 24th; Allison, 6th, 18th, 28th; West Leavenworth, 7th; Fort Scott, 11th; Wellington, 17th, 18th; Dodge City, Salina, and Westmoreland, 18th; Topeka and Wyandotte, 26th; Manhattan, 18th, 28th; Sherlock, 28th; Elk Falls, 29th.

Kentucky.—Frankfort and Richmond, 15th.

Louisiana.—Liberty Hill, 14th, 17th, 27th.

Maryland.—Ocean City, 8th; Emmitsburg, 22d.

Massachusetts.—Provincetown, 2d, 9th; Somerset, 2d, 11th.

Michigan.—Detroit, Lansing, and Swartz Creek, 1st; Port Huron, 27th; Kalamazoo, 30th.

Minnesota.—Currie, 14th; Chester, 26th, 27th; Saint Vincent, 29th.

Missouri.—Pierce City, 18th.

Montana.—Fort Ellis, 13th; Fort Assinaboine, 25th.

Nebraska.—Marquette, 6th, 7th, 27th; Red Willow, 13th; Omaha, 18th; Genoa, 26th, 28th; Stockham, 28th.

Nevada.—Carson City, 9th, 16th; Fort McDermitt, 12th, 26th.

New Jersey.—Vineland, 2d; Moorestown, 9th; Readington, 16th.

New Mexico.—Fort Union, 5th; Fort Wingate, 10th, 13th.

New York.—New York City and Mountainville, 2d; Humphrey, 2d, 8th.

North Carolina.—Weldon, 2d; Highlands, 14th; New River Inlet, 15th.

Ohio.—Cincinnati and College Hill, 1st; Sandusky, 2d; Columbus, 15th; Jacksonborough and North Lewisburg, 22d.

Oregon.—Portland, 14th; Albany, 15th, 27th; Roseburg, 27th.

Pennsylvania.—Fallsington and Leetsdale, 2d; Wellsborough, 9th; Pittsburg, 25th.

Tennessee.—Chattanooga, 2d; Memphis, 14th.

Texas.—Fort Davis, 4th; Indianola, 5th; Fort Clark, 5th, 14th, 27th; Fort Elliott, 28th.

Utah.—Nephi, 10th, 12th, 14th, 28th; Salt Lake City, 13th, 18th, 25th, 28th.

Virginia.—Accotink and Johnstown, 2d; Fort Myer, 2d, 22d; Wytheville, 15th.

Washington Territory.—Olympia, 11th; Spokane Falls, 25th; Fort Spokane, 29th.

West Virginia.—Helvetia, 25th.

Wisconsin.—Milwaukee, 1st.

COTTON REGION REPORTS.

Temperature and rainfall observations in the cotton districts were resumed April 1st.

In the table below are given the averages for the several districts for April, 1884, with the means for the same months in the two preceding years. A comparison of the rainfall shows deficiencies in all but three districts, viz., those of Charleston, Galveston, and Little Rock, where excesses of 1.04, 2.80, and 0.90 are reported. Large deficiencies occurred in the districts of Mobile, Montgomery, and Vicksburg, where they were 4.66, 3.19, and 2.96, respectively.

The means of the maximum and minimum temperatures for April, 1884, were below the means of the preceding years in all districts, the departures varying from 2° 2 to 6° 6.

Temperature and rainfall data for the cotton districts, April.

Districts.	Rainfall.			Temperature.									Extremes for April, 1884.	
	Average for April of two preceding years.	Average for April, 1884.	Departures.	Maximum.			Minimum.							
				Mean for April of two preceding years.	Mean for April, 1884.	Departures.	Mean for April of two preceding years.	Mean for April, 1884.	Departures.					
New Orleans.....	6.31	5.54	- 0.77	81.0	75.4	- 5.6	59.8	56.7	- 3.1	87	6			
Savannah.....	4.69	3.23	- 1.46	80.8	77.5	- 3.3	59.1	55.8	- 3.3	98	15			
Charleston.....	3.12	4.16	+ 1.04	77.0	73.6	- 3.4	54.7	50.4	- 4.3	90	31			
Atlanta.....	5.44	5.09	- 0.35	75.2	70.8	- 4.4	53.0	47.9	- 5.1	91	27			
Wilmington ..	4.42	3.17	- 1.25	74.5	69.9	- 4.6	49.3	46.8	- 2.5	88	21			
Memphis.....	6.11	5.98	- 0.13	80.9	75.3	- 5.6	57.6	49.5	- 8.1	87	29			
Galveston.....	1.74	4.54	+ 2.80	80.8	75.3	- 5.5	57.6	51.3	- 6.3	88	25			
Vicksburg.....	7.48	4.52	- 2.96	77.8	74.7	- 3.1	56.2	54.0	- 2.2	89	40			
Montgomery ..	6.82	3.63	- 3.19	78.3	74.7	- 3.6	55.4	49.8	- 5.6	94	28			
Augusta.....	4.81	4.49	- 0.32	77.5	71.0	- 6.5	54.7	48.1	- 6.6	93	20			
Little Rock....	8.76	6.66	+ 0.90	75.6	72.2	- 3.4	52.9	47.3	- 5.6	89	20			
Mobile.....	8.30	3.64	- 4.66	80.0	75.9	- 4.1	57.2	52.7	- 4.5	91	36			

WINDS.

The most frequent directions of the wind during April, 1884, at the Signal Service stations, are shown on chart ii. by arrows flying with the wind. In the Gulf states the most frequent directions were southerly; in the Ohio valley, Tennessee and the south Atlantic states, from southwest to northwest; in New Jersey, Maryland, and Virginia, northwesterly; in New England, from northwest to southwest; in the lake region, upper Mississippi valley, and north Pacific coast region, variable; in the Missouri valley, northerly; in California, from south to west.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, wind velocities of fifty or more miles per hour occurred on the following dates: 1st, 3d, 4th, 5th, 12th, 13th, 15th, 16th, 17th, 22d, 23d, 28th, the highest velocities being 92, nw., 4th, (maximum for month); 86, se., 15th; 80 s., 16th.

On the summit of Pike's Peak, Colorado, the maximum velocity of the month, 80 nw., occurred on the 1st; and velocities of fifty or more miles per hour occurred on the 7th, 8th, 11th, 13th, 14th, 15th, 16th, 17th, 24th, 25th, 26th, 28th.

Other high winds occurred during the month as follows:

Fort Maginnis, Montana, 52, w., 18th.

Dodge City, Kansas, 64, se., 28th.

West Las Animas, Colorado, 50, nw., 13th.

Yankton, Dakota, 56, se., 29th.

Indianola, Texas, 56, n., 20th.

Duluth, Minnesota, 50, ne. 14th.

Milwaukee, Wisconsin, 53, sw., 27th.

Eastport, Maine, 50, ne., 3d.

Sandy Hook, New Jersey, 57, nw., 3d.

Cape May, New Jersey, 60, nw., 3d; 56, w., 9th; 78, w., 10th.

Delaware Breakwater, Delaware, 52, sw., 9th.

Fort Macon, North Carolina, 52, sw., 2d.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	9,941	Eastport, Maine.....	6 253
Middle Atlantic states.....	Sandy Hook, N. J.....	12,155	Lynchburg, Va.....	3,391
South Atlantic states.....	Fort Macon, N. C.....	16,799	Augusta, Ga.....	2,801
Florida peninsula.....	Cedar Keys.....	7,536	Sanford.....	5,065
Eastern Gulf states.....	Pensacola, Fla.....	6,325	New Orleans, La.....	4,313
Western Gulf states.....	Indianola, Tex.....	12,257	Little Rock, Ark.....	4,528
Ohio valley.....	Louisville, Ky.....	6,341	Cincinnati, Ohio.....	4,619
Tennessee.....	Nashville.....	5,427	Memphis.....	4,667
Lower lake region.....	Sandusky, Ohio.....	10,497	Detroit, Mich.....	5,582
Upper lake region.....	Milwaukee, Wis.....	8,870	Chicago, Ill.....	6,364
Extreme northwest.....	Fort Buford, Dak.....	7,573	Saint Vincent, Minn.....	4,755
Upper Mississippi valley.....	Saint Louis, Mo.....	10,160	Dubuque, Iowa.....	4,995
Missouri valley.....	Yankton, Dak.....	8,397	Omaha, Nebr.....	4,876
Northern slope.....	North Platte, Nebr.....	9,667	Deadwood, Dak.....	2,932
Middle slope.....	Dodge City, Kan.....	11,553	Denver, Colo.....	4,839
Southern slope.....	Fort Concho, Tex.....	7,149	Fort Davis, Tex.....	5,851
Southern plateau.....	Prescott, Ariz.....	6,275	El Paso, Tex.....	4,449
Northern plateau.....	Dayton, Wash. T.....	4,622	Lewiston, Idaho.....	1,673
North Pacific coast region.....	Tatoosh Island, W. T.....	7,444	Olympia, Wash. T.....	1,574
Middle Pacific coast region.....	San Francisco, Cal.....	6,633	Sacramento, Cal.....	5,609
South Pacific coast region.....	San Diego, Cal.....	4,779	Yuma, Ariz.....	4,458

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 15,970 (incorrect on account of frost-work), and 16,765 miles, respectively.

LOCAL STORMS.

Local storms occurred during April as follows:

Alabama.—Huntsville, Madison county: a severe storm occurred eleven miles east of this place during the night of the 1-2d, which destroyed buildings and caused loss of life.

Reports from Chattanooga, Tennessee, on the 2d, stated that a destructive tornado passed over the northern portions of Alabama and Georgia during the night of the 1-2d. It appears to have been most destructive in the vicinity of Collinsville, De Kalb county, Alabama, and in Dade county, Georgia. Near Huntsville, Madison county, Georgia, several persons were killed. The path of the tornado was about three hundred yards in width.

Auburn, Lee county: at about noon of the 15th a tornado occurred a few miles south of this place, which caused considerable damage for a distance of about eight miles. There were four farms in the immediate track of the storm, all of which sustained damage. Twelve houses were destroyed, much fencing swept away, and two persons injured. This storm originated about four miles southwest of Auburn, and passed eastward into Georgia. In that state a number of persons were killed and a large amount of damage done.

Decatur, Morgan county: a storm occurred about seven miles east of this place on the evening of the 15th, causing much damage to buildings and fencing.

Florida.—Jacksonville: during the storm of the 2d, the steamer "Seminole," was blown ashore one mile south of this station, and other damage caused.

Georgia.—Columbus, Muscogee county: a violent wind and rain storm passed over this city on the night of the 14-15th. The rainfall was very heavy, more than three inches having fallen in three hours.

Chipley, Harris county: a destructive tornado passed over this county at 2.30 a. m. of the 15th. Forty buildings were destroyed and seven persons killed. At Merriwether a large amount of property was destroyed and six persons killed. Reports from Sandtown, Campbell county, state that ten persons were killed in that vicinity and that much property was destroyed.

Indiana.—Muncie, Delaware county: a destructive tornado passed through this county on the afternoon of the 1st. The village of Oakland, seven miles south of Muncie, was almost entirely destroyed. Of thirty houses all but three were wrecked. About fifty persons were more or less injured and four were instantly killed.

Iowa.—Fort Dodge, Webster county: a severe storm occurred during the night of the 27-28th, blowing down and unroofing buildings.

Kansas.—Atchison: a violent storm occurred on the 18th, beginning at 7.30 p. m., and lasting about one hour. The rain-

fall was very heavy and flooded the streets. The neighboring creeks rose rapidly, washing away numerous bridges.

Garnett, Anderson county: at 5.30 p. m. of the 27th a tornado cloud was observed passing through the western part of this county. The cloud was almost vertical near the earth, but the upper portion was inclined northward. It formed near Westphalia, seventeen miles west of Garnett and passed north-eastward for a distance of eight or nine miles. Its course was over an open prairie, consequently but little damage was done. The cloud was plainly visible from Garnett for about thirty minutes, and moved so slowly that it was successfully photographed during its progress. At about three miles north of Westphalia a wagon laden with lumber was struck by the tornado. The lumber was scattered over the prairie, and the driver and horses were carried a considerable distance in the air. No precipitation accompanied the storm.

Coffeyville, Montgomery county: a destructive wind storm occurred on the afternoon of the 30th. Several barns were blown down and numerous buildings were unroofed.

Maryland.—Baltimore: vessels arriving at this port on the 5th, report that an unusually severe storm prevailed in the Chesapeake bay on the 4th, causing numerous disasters.

Mississippi.—Vicksburg: on the evening of the 1st, a severe storm occurred at South station, fourteen miles east of Vicksburg, where two dwellings were destroyed. On the afternoon of the 14th a severe storm passed over Vicksburg, which caused considerable damage to buildings, signs, trees, etc.

Black Hawk, Carroll county: this place was visited by a destructive tornado on the 14th, which destroyed several dwellings.

Grenada: on the afternoon of the 14th, a very destructive storm passed one mile south of this place, demolishing dwellings and blowing down trees and fencing.

West Point: a violent wind and rain storm occurred on the afternoon of the 14th, prostrating trees and fences and demolishing small buildings. Reports from Jackson and Beauregard state that the storm at those places was very severe.

Missouri.—Saint Joseph, 28th: reports from Union Star, De Kalb county, state that on the evening of the 24th that place was visited by a violent tornado, which destroyed several buildings. The storm occurred at about six o'clock and was of very short duration. Its path was about fifty feet in width, and the cloud was funnel-shaped.

Carthage, Jasper county: on the night of the 26-27th, a tornado occurred in this county about ten miles south of Carthage. Several farm houses and much fencing were destroyed.

Montana.—Helena: a violent wind and rain storm visited this section during the night of the 27-28th, which caused damage to property in this town and vicinity.

North Carolina.—Scott's Hill: a destructive westerly storm occurred on the 2d.

Hatteras: during a strong northwesterly gale on the 3d the steamer "W. C. Pierepont" went ashore.

Fort Macon: a severe thunder storm prevailed from 8 to 10.30 p. m. of the 15th; wind velocity forty miles.

Ohio.—Greenville, Darke county: at 6.30 p. m. of the 1st a violent tornado passed a few miles south of this place. The tornado passed in a southeasterly direction and destroyed numerous residences and out-buildings.

Columbus: a destructive storm passed over Reynoldsburg, twelve miles east of this city, during the night of the 1-2d. Several dwellings and out-buildings were blown down and great damage was done to orchards and fencing. At Dublin, Franklin county, numerous buildings were damaged. The storm was also very destructive at Mechanicsburg, Joysville, Mutual, and Bowlsville.

Toledo: a strong gale prevailed on the 22d, the wind reaching a velocity of forty-eight miles. Considerable damage was done in this city and adjacent country.

Dayton, Montgomery county: between 4 and 5 p. m. of the 27th a destructive storm passed over the southern portions of Montgomery and Greene counties. It appears to have origi-

nated in the vicinity of Woodford, a village ten miles south of Dayton, and moved in an easterly course. At Alexandersville, six miles south of Dayton, a number of buildings were destroyed and several persons were injured. The tornado was also very destructive at Woodburn, Miamisburg, Bellbrook, Carrollton, and Jamestown. At Jamestown six persons were killed and about two-thirds of the buildings in town were ruined. The damage is estimated at from \$150,000 to \$200,000. At Bellbrook about fifteen buildings were more or less damaged.

Pennsylvania.—Pittsburg: on the morning of the 2d the Monongahela valley was visited by a violent storm, which caused a large amount of damage. The storm's course was along the south side of the Monongahela river. At Homestead, Alleghany county, several buildings were blown down.

South Carolina.—Summerville, Berkeley county: a violent northwesterly wind storm prevailed on the 2d. No damage occurred other than the blowing down of fences and a few trees.

Columbia: a very high wind prevailed on the 2d, which blew down fences and trees and caused slight injury to a few buildings.

Texas.—Del Rio, Kenney county: a tornado occurred between 6 and 7 p. m. of the 30th, wrecking several buildings. The damage to the town is estimated at \$10,000.

Dallas: on the morning of the 18th, a violent wind and rain storm passed over this city. A school building was blown down and ten of thirty-two pupils were more or less seriously injured. Trees and fencing throughout the city were blown down. Very heavy rain accompanied the storm. This region was also visited by a heavy rain and wind storm on the night of the 27-28th. The rainfall was remarkably heavy. On the morning of the 28th, it was observed that the current in Trinity river had changed, the water running in the opposite direction. This phenomenon was supposed to be due to the swollen condition of the river and its tributaries below Dallas. Early settlers state that a similar phenomenon occurred once before, about twenty-five years ago.

Virginia.—Lynchburg: a severe wind storm prevailed during the night of the 2-3d. Several houses were blown down in the adjoining counties, and considerable damage was caused in the suburbs of this city.

Wisconsin.—Milwaukee: numerous disasters occurred on Lake Michigan during the storm of the 20th.

NAVIGATION.

OPENING OF NAVIGATION.

Lake Ontario.—Rochester, New York: navigation was resumed on the 3d, the first boat of the season arriving at Charlotte on that date.

Lake Erie.—Buffalo, New York: the steamer "William Edwards" left this port for Chicago on the 22d, being the first departure of the season.

Erie, Pennsylvania: navigation was resumed on the 19th.

Lake Huron.—Port Huron, Michigan: the steamer "Concord" left for the upper ports on the 8th, being the first departure of the season. The steamer "Flora," from Detroit, reached this port on the 9th, being the first arrival of the season.

Alpena, Michigan: the steamer "Flora," from Detroit, arrived on the 11th, being the first boat of the season.

Straits of Mackinac.—Mackinaw City, Michigan: the first arrival of the season occurred on the 24th; navigation was resumed on the 28th.

Lake Michigan.—Milwaukee, Wisconsin: the steam barge "William Edwards," bound from Buffalo to Chicago, passed this port on the 27th, and was the first boat of the season to pass through the Straits of Mackinac. The first steamer from the lower lakes arrived on the 30th.

Escanaba, Michigan: the first boat of the season arrived on the 21st.

Lake Superior.—Marquette, Michigan: the tug "A. L. Johnson," from Sandusky, Ohio, arrived on the 30th. Although

considerable ice remained in the lake on that date, navigation was considered open for the season.

Fort Brady, Michigan: the first boat of the season arrived on the 25th.

Mississippi river.—Dubuque, Iowa: the first steamer of the season arrived on the 7th.

Saint Paul, Minnesota: the steamer "Saint Paul," the first boat of the season, from Saint Louis, arrived on the 16th, having experienced no difficulty in her passage upward.

Missouri river.—Leavenworth, Kansas: the steamer "Montana," the first boat of the season from Saint Louis, arrived on the 7th.

Yankton, Dakota: the first steamer of the season arrived on the 11th.

Fort Bennett, Dakota: the first steamer of the season arrived on the 12th.

North Branch Canal.—Catawissa, Columbia county, Pennsylvania: navigation was resumed on the 7th.

STAGE OF WATER IN RIVERS.

The Mississippi, Missouri and Ohio rivers were highest at the beginning and lowest at the close of the month, the lower Mississippi continuing above the danger line throughout the month. At Omaha, Nebraska, the Missouri river reached a point one foot above the danger line on the 6th. The Ohio river continued low throughout its course during the whole month, the highest stage at Cincinnati, Ohio, on the 6th, being more than eighteen feet below the danger line.

In the following table are shown the danger points at the various river stations; the highest and lowest stages for April, 1884, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, April, 1884.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, Louisiana.....	29 9	30	20 6	13	16 7	3 11
Arkansas:						
Little Rock, Arkansas.....	33 0	29	13 10	11	7 5	6 5
Fort Smith, Arkansas.....	26	3 3	12	—1 7†	4 10	
Missouri:						
Yankton, Dakota.....	20 0	4	20 1	25	6 6	13 7
Omaha, Nebraska.....	16 0	6	17 0	26, 27, 28	7 8	9 7
Leavenworth, Kansas.....	21 0	9	17 11	29	10 8	7 3
Mississippi:						
Saint Paul, Minnesota.....	14 6	3	9 10	27	6 0	3 10
La Crosse, Wisconsin.....	18 0	1	8 1	30	6 0	2 1
Dubuque, Iowa.....	21 10	3, 4	13 2	22, 23, 24	10 6	2 8
Davenport, Iowa.....	15 0	4	11 7	25, 27, 28	8 2	3 5
Keokuk, Iowa.....	14 6	1	16 7	29, 30	8 10	7 9
Saint Louis, Missouri.....	30 0	9	28 2	30	20 10	7 4
Cairo, Illinois.....	40 0	1	47 11	30	37 4	10 7
Memphis, Tennessee.....	34 0	2	34 0	30	30 3	3 7
Vicksburg, Mississippi.....	41 0	1	47 8	26 to 30	45 2	2 6
New Orleans, Louisiana *.....	—2 6	1, 2, 3, 5, 6	—0 6	28, 29, 30	—1 10	1 4
Ohio:						
Pittsburg, Pennsylvania.....	20 0	4	12 6	25	3 8	8 10
Cincinnati, Ohio.....	50 0	6	31 8	16, 23	17 8	14 0
Louisville, Kentucky.....	24 0	1	11 8	19	7 7	4 1
Cumberland:						
Nashville, Tennessee.....	42 0	1	22 7	14	7 2	15 5
Tennessee:						
Chattanooga, Tennessee.....	33 0	17	16 11	13	6 6	10 5
Monongahela:						
Pittsburg, Pennsylvania.....	29 0	4	12 6	25	3 8	8 10
Savannah:						
Augusta, Georgia.....	—	16	27 11	12	8 3	19 8
Willamette:						
Portland, Oregon.....	—	28	11 5	4	3 7	7 10
Sacramento:						
Red Bluff, California.....	—	15	21 0	7	4 0	17 0
Sacramento, California.....	—	20, 21, 22	23 6	7, 8	19 9	3 9
Mobile:						
Mobile, Alabama.....	—	14	17 4	9	14 11	3 5
Colorado:						
Yuma, Arizona.....	—	21	20 4	1	17 8	2 8

* Below high-water mark of 1874 and 1883.

† below bench-mark.

ICE IN RIVERS AND HARBORS.

Kennebec river.—Portland, Maine: ice left the Kennebec river on the 10th, on which date navigation was resumed after a suspension of one hundred and twenty-nine days.

Kenduskeag creek.—Bangor, Maine: the breaking of the ice-

dam in the creek on the 6th caused damage estimated at \$30,000.

Newfound lake.—Bristol, Grafton county, New Hampshire: ice went out of the lake on the 28th.

Lake Champlain.—Burlington, Vermont: ice left the lake during the 19th and 20th.

Sackett's harbor.—Madison Barracks, New York: ice broke up on the 11th.

Niagara river.—Buffalo, New York: floating ice 3d to 7th, 9th, 10th, 12th to 15th, 17th to 23d.

Lake Huron.—Port Huron, Michigan: lake clear of ice on the 17th.

Thunder bay and Thunder bay river.—Alpena, Michigan: floating ice 2d to 5th.

Saint Clair river.—Port Huron, Michigan: floating ice on the 14th and 15th.

Straits of Mackinac.—Mackinaw City: on the 3d and 4th the ice in the straits was sufficiently strong to bear the weight of teams. The steamer "Algomah," in attempting to cross the straits on the 14th, was surrounded by ice and damaged to a considerable extent. On the 17th, the ice in the straits was from one to six feet in thickness. Straits clear of ice on the 26th.

Little bay de Noquet.—Escanaba, Michigan: ice broke up and moved out of the bay on the 15th.

Lake Michigan.—Milwaukee, Wisconsin: ice broke up along the shores on the 4th. The ice in Milwaukee river broke up and moved out on the 1st.

Lake Superior.—Duluth, Minnesota, 30th: the ice in the lake, although broken by the storms during the month, remained too solid to permit navigation.

Marquette, Michigan: the ice began to move out of the harbor on the 27th; on the 28th the harbor was clear of ice, but was again obstructed on the 30th.

Red river of the North.—Fort Pembina, Dakota: ice in river broke up on the 16th; river clear of ice on 19th.

Saint Vincent, Minnesota: the ice in river broke up and moved out on the 13th; river free of ice on the 19th.

Missouri river.—Fort Buford, Dakota: river clear of ice on the 3d.

Big Horn river.—Fort Custer, Montana: the ice in river broke up on the 1st.

FLOODS.

There was a moderate but steady decline in the lower Mississippi river during April. At Cairo the highest stage, forty-seven feet eleven inches, on the 1st, was ten feet seven inches above the lowest stage on the 30th. At Memphis, Tennessee, the highest point, thirty-four feet on the 2d, was three feet seven inches higher than the lowest stage on the 30th. At Vicksburg, Mississippi, and New Orleans, Louisiana, the monthly ranges were two feet six inches and one foot four inches respectively, the highest stages occurring at the beginning of the month and the lowest stages occurring at the close of the month.

The month closed with the river three feet seven inches below the danger-line at Memphis; four feet two inches above the danger-line at Vicksburg, and eight inches above the danger-line at New Orleans.

The following notes relating to the flood in the lower Mississippi during April have been received.

Cairo, Illinois: the bottom lands in this vicinity were still overflowed to a considerable extent on the 30th. In the lower portions of Cairo street railway travel was suspended on account of the overflowed condition of the tracks.

Memphis, Tennessee: traffic on the Memphis and Little Rock railroad, which had been suspended on account of the high water, was resumed on the 18th. From the 1st to 5th "Buffalo" gnats were very destructive to stock in the lowlands which had been recently overflowed.

Helena, Arkansas: on the 14th, the Mississippi was stationary at forty-four feet, ten inches above low-water mark. On that

date about two-thirds of the area subject to overflow was inundated. The "Buffalo" gnats appeared in large numbers and were killing many mules and horses.

Vicksburg, Mississippi: on the 4th, the United States steamer "General Barnard" arrived from Saint Louis, bringing 100,000 rations for distribution among the flood sufferers.

New Orleans, Louisiana: on the 2d, about 2,000 residences in Saint Charles parish were under water; rations for 7,050 persons were sent to the sufferers in the neighborhood of the Black and Little rivers. The crevasse at Raleigh, in East Carroll parish, was 1,000 feet wide on this date.

The following extract from a communication received from Mr. Bernard Titcher, dated New Orleans, May 11, 1884 has been furnished by Private G. E. Curtis, Signal Corps, United States Army:

This year's overflow is enormously disastrous. Many portions of the state are still under water and farmers are compelled reluctantly to abandon their lands, as they will be unable to make any crops this year. Within my memory there has been nothing so calamitous here. For the last five years the inundations have been annual and of increasing destructiveness. The sugar planters whose plantations are submerged are doubly unfortunate because the seed cane has been nearly if not all quite destroyed, and therefore, the crop for next year can be planted only at greatly increased expense, if at all. To add to this many parishes are suffering unprecedented loss of stock. The conditions attendant upon an overflow are usually very favorable for the breeding and propagation, in swamps or low lands of a species of gnat of unusual size, called the giant or "Buffalo" gnat. This is very destructive to cattle, and this year they have been extraordinarily large and poisonous. Horses, cattle, hogs, and sheep are worried to death. Farmers keep dense smoke throughout their fields to drive away these pests, and where farmers have been kept too busy (or have neglected) to feed their stock, (the stock in the absence of an overflow find abundant pasturage) horses and cattle have died of hunger at the smokes as the gnats would not allow them to leave. A very fatal disease called charbon (or charbone) is killing the animals that escape the gnats. It is believed to be caused by the poisonous gnats, but I suppose the better theory is, that the gnats merely scatter the disease by a sort of inoculation. Many well-to-do farmers have no horses or mules with which to work their grounds, and the tales of loss that reach me are truly pitiful. I trust the outcome may be better than is anticipated. I heard of a country friend who has lost a score of horses and mules, and hundreds of cattle, hogs, and sheep.

Floods occurred in the several states during April as follows:

Alabama.—Birmingham, Jefferson county: a heavy rainfall occurred on the morning of the 15th, which caused washouts on all railroads entering this place. Several miles of the track of the Georgia Pacific railroad, between Birmingham and Anniston, Calhoun county, were washed away, and the bridge near Birmingham was washed several feet out of place. In the vicinity of Anniston the streams were from two to three feet higher than ever before known. The farming lands in this region were badly washed.

Arkansas.—Hope, Hempstead county: a very heavy fall of rain occurred on the 18th. Two railway trestles in this vicinity were washed away, delaying trains in consequence.

Texarkana, Miller county: the heavy rain of the 18th caused washouts on the railroads in this vicinity.

Little Rock: the heavy rains of the 18th and 19th caused much damage to railroads and other property in this state. Trains were delayed on the Iron Mountain railroad on account of washouts, and many portions of the flat prairie country north of Devall's Bluff were inundated.

Hot Springs: a very heavy rainfall occurred during the night of 29-30th, which caused the Ouachita river to overflow. Trains on the Iron Mountain railroad were reported to have been delayed between Malvern and Texarkana on account of high water.

California.—Los Angeles: the heavy rains of the 9-10th caused washouts on the railroads both east and west of Los Angeles, resulting in the delay of trains.

San Francisco, 11th: the recent heavy rains caused serious washouts on the Southern Pacific railroad through Soledad cañon. At Newhall, Keene, and Mojave the railroad tracks were washed away.

Princeton, Colusa county: on the 17th the Sacramento river

reached a height of twenty-three feet six inches, which is two inches higher than any previous high-water record. The observer states that this unprecedented height was due not so much to the amount of rainfall as to the recent construction of levees and closing of outlets, as the rains preceding the rise were not as heavy as have occurred in former years.

Lathrop, San Joaquin county: a levee on the San Joaquin river broke on the morning of the 18th, causing a damaging overflow.

Connecticut.—Hartford: on the 18th the Connecticut river was twenty feet above its average height. All docks below Middletown, Middlesex county, were overflowed.

Georgia.—Atlanta: the heavy rainfall on the morning of the 15th caused injury to the railroads in this vicinity.

Milledgeville, Baldwin county: the heavy rains of the 16th and 21st caused much damage to the soil prepared for the spring crops.

Rome, Floyd county: on the 17th, more than one-half of the houses in Rome were inundated by the overflow of the Oostanaula and Etowah rivers. The water reached a height thirty-nine feet six inches above low-water mark, which is within eleven inches of the height of the great flood of March 11, 1881, when the highest stage of water ever known at this place occurred. The flood began on the 14th, and on the 17th, the water continued to rise at the rate of two inches per hour. The flooding of the town caused a general suspension of business. The water and gas works were inundated; the post office was closed and the telegraph office was moved. Great damage was done to the farms along the river, many farmers having their newly planted corn and cotton swept away.

Kansas.—Atchison, Atchison county: on the 18th White Clay creek, which runs through this city, was swollen by the heavy rains to a greater height than ever before known. Residents in lower parts of the city had to abandon their homes, and several buildings were floated away. Numerous bridges in this vicinity were washed away.

Louisiana.—Franklin, Saint Mary's parish: the heavy rains of the 5th and 6th caused a rise of ten inches in the Teche river. On the 6th the river was twenty inches below high-water mark of 1874, and a number of plantations along its east bank were under water.

Opelousas, Saint Landry parish: the heavy rains of the 4th and 5th caused an overflow of the bayous in this vicinity.

Maine.—Portland: The rivers and streams in this vicinity were much swollen on the 17th; numerous bridges and much lumber were swept away.

Biddeford, York county: on the 18th the Saco river reached the highest stage that has occurred since 1870. Reports from Augusta state that all of the mills at that place were compelled to suspend work.

Calais, Washington county: the lowlands between this place and Princeton were under water on the 18th. All of the mills along the Saint Croix river were shut down, and a bridge at Baring, eighty feet in length was washed away.

Bangor, 18th: the high water in the Penobscot river damaged the Maine Central railroad bridge and washed away a part of the Freeze boom at Orono. On the 23d the river reached the highest stage that has occurred for fourteen years. Many thousand feet of logs were swept away.

Brunswick, Cumberland county: the Androscoggin river reached the highest stage that has occurred during the last ten years.

Ellsworth, Hancock county, 18th: the water in Union river reached the highest stage that has occurred for several years.

Missouri.—Joplin, Jasper county: the very heavy rainfall of the 28th cause the neighboring streams to rise rapidly. The mines in this region were flooded to such an extent as to delay work for several days.

New Hampshire.—Laconia, Belknap county: the heavy rains of the 17-18th caused the water in Lake Winnepesaukee to rise to a height several feet above high-water mark. A number of mills suspended work, and great fears for the safety of the dam at Lake Village were entertained.

Nashua, Hillsborough county: on the 18th the Merrimack river had reached a point ten feet above low-water mark and flooded a part of the city.

Hanover, Grafton county: the Connecticut river reached a high stage at this place on the 18th. The meadows and high-ways adjacent to the river were submerged.

Province of Quebec.—Montreal: the heavy rains on the night of the 15-16th, flooded the lower portions of this city. The water in the river rose to within six inches of the top of the revetment wall on the river front.

Tennessee.—Chattanooga: the heavy rains on the 14th caused much damage to the Western and Atlantic railroad by washing away the tracks.

Texas.—Longview, Gregg county, 21st: the recent heavy rains caused an overflow of the Sabine river. The lowlands were inundated and about two million feet of logs were floated away.

HIGH TIDES.

Galveston, Texas: the strong southerly gale on the 28th and 29th caused considerable damage to the east end of Galveston island by forcing the water from the Gulf far in shore. The high surf wrecked a number of portable bath-houses on the beach.

Bangor, Maine, 26th, 27th, overflowing the wharves.

New River Inlet, North Carolina, 22d to 26th.

Hatteras, North Carolina, 3d.

Fort Macon, North Carolina, 25th, 26th.

Cedar Keys, Florida, 12th, 15th.

Indianola, Texas, 4th, 17th, 19th, 30th.

LOW TIDES.

New River Inlet, North Carolina, 3d.

Cedar Keys, Florida, 6th, 9th, 25th.

Indianola, Texas, 21st to 25th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for April, 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.63 per cent. The percentages for the four elements are: weather, 86.56; direction of the wind, 79.70; temperature, 83.02; barometer, 86.55 per cent. By geographical districts they are: for New England, 76.72; middle Atlantic states, 83.09; south Atlantic states, 86.83; eastern Gulf states, 85.65; western Gulf states, 86.67; lower lake region, 82.81; upper lake region, 82.47; Ohio valley and Tennessee, 85.25; upper Mississippi valley, 84.90; Missouri valley, 82.39; north Pacific coast region, 90.74; middle Pacific coast region, 81.00; south Pacific coast region, 79.35. There were twenty-seven omissions to predict, out of 3,210 or 0.84 per cent. Of the 3,183 predictions that have been made, seventy-five, or 2.36 per cent., are considered to have entirely failed; one hundred and thirty-three, or 4.18 per cent., were one-fourth verified; four hundred and thirty, or 13.51 per cent., were one-half verified; five hundred and twenty-five, or 16.49 per cent., were three-fourths verified; 2,020, or 63.46 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During April 1884, one hundred and sixty-six cautionary signals were ordered. Of these, one hundred and forty-four, or 86.75 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Sixty-three cautionary off-shore signals were ordered, of which number, fifty-two, or 82.54 per cent., were fully justified both as to direction and velocity; sixty, or 95.24 per cent., were justified as to direction; and fifty-five, or 87.30 per cent., were justified as to velocity. Two hundred and twenty-nine signals of all kinds were ordered, one hundred and ninety-six, or 85.59 per cent., being fully justified. These do not include signals ordered at display stations, where the velocity of the

wind is only estimated. Of the above cautionary off-shore signals, forty-eight were changed from cautionary. Nine signals were ordered late. In sixty-seven cases, winds of twenty-five miles or more, per hour, were reported for which no signals were ordered.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors during April, 1884, with the average depth at which the observations were made and the mean temperature of the air at the various stations, are given in the table below. Observations were interrupted by ice at the following stations: Alpena, Michigan, on the 1st; Buffalo, New York, 1st, 6th, 12th, 13th; Detroit, Michigan, 1st, 2d; Duluth, Minnesota, from 1st to 30th; Escanaba, Michigan, 1st to 16th; Mackinaw City, Michigan, from 1st to 18th; Marquette, Michigan, from 1st to 27th; Milwaukee, Wisconsin, 1st 2d, 3d. The highest water temperatures observed during the month were 83° 5 and 79° at Key West and Cedar Keys, Florida, respectively, on the 19th; the lowest were 30° 5 at Alpena, Michigan, on the 7th; 33° 1 at Escanaba, Michigan, on the 17th; and 33° 1 at Buffalo, New York, on the 14th and 30th. The largest monthly ranges were: 21° 1, Cedar Keys, Florida; 17° 7, Chincoteague, Virginia; and 17° 5, Alpena, Michigan. The smallest monthly ranges were: 4° 9, Fort Canby, Washington Territory; 4° 6, Wilmington, North Carolina; 4° 3, Eastport, Maine; and 3° 2, San Francisco, California.

Temperature of water for April, 1884.

Station.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
Atlantic City, New Jersey.....	50.1	42.9	7.2	4 7		47.0
Alpena, Michigan.....	48.0	39.5	17.5	11 6		37.3
Augusta, Georgia.....	70.0	56.7	13.3	12 6		62.1
Baltimore, Maryland.....	56.6	44.9	11.7	9 8		52.3
Block Island, Rhode Island.....	46.1	37.0	9.1	8 4		42.9
Boston, Massachusetts.....	46.1	34.8	11.3	32 8		42.7
Buffalo, New York.....	37.9	33.1	4.8	9 7		39.7
Canby, Fort, Washington.....	51.9	47.0	4.9	16 4		50.5
Cedar Keys, Florida.....	79.0	57.9	21.1	11 5		69.0
Charleston, South Carolina.....	68.2	62.0	6.2	41 10		63.3
Chicago, Illinois.....	48.0	38.5	9.5	8 4		44.3
Chincoteague, Virginia.....	60.0	42.3	17.7	4 9		48.8
Cleveland, Ohio.....	48.3	37.8	10.5	14 0		43.5
Detroit, Michigan.....	48.2	37.0	11.2	22 11		45.5
Delaware Breakwater, Delaware.....	50.3	39.9	13.4	8 9		47.2
Duluth, Minnesota.....						
Eastport, Maine.....	37.7	33.4	4.3	16 3		39.9
Escanaba, Michigan.....	41.4	33.1	8.3	15 0		36.3
Galveston, Texas.....	73.3	62.0	11.3	12 3		67.2
Grand Haven, Michigan.....	55.6	42.9	12.7	19 0		43.7
Indianola, Texas.....	74.5	61.0	13.5	9 2		67.5
Jacksonville, Florida.....	74.5	67.0	7.5	18 0		68.7
Key West, Florida.....	83.5	74.8	8.7	17 6		76.2
Mackinaw City, Michigan.....	38.1	33.4	4.7	10 0		37.3
Macon, Fort, North Carolina.....	67.0	55.5	11.5	6 2		57.2
Marquette, Michigan.....	36.3	35.0	1.3	9 11		35.6
Milwaukee, Wisconsin.....	45.7	38.7	7.0	8 0		40.9
Mobile, Alabama.....	69.5	56.0	13.5	16 3		66.2
New Haven, Connecticut.....	49.3	35.9	13.4	15 8		44.9
New London, Connecticut.....	44.7	37.5	7.2	12 9		45.4
New York City.....	50.0	37.5	12.5	16 5		47.6
Norfolk, Virginia.....	60.2	50.0	10.2	17 1		54.5
Pensacola, Florida.....	71.5	64.1	7.4	17 5		66.3
Portland, Maine.....	43.0	34.4	8.6	16 9		45.7
Portland, Oregon.....	55.2	49.2	6.0	58 4		54.1
Sandusky, Ohio.....	52.0	39.0	13.0	11 2		44.9
Sandy Hook, New Jersey.....	47.0	39.8	7.2	1 5		47.2
San Francisco, California.....	58.2	55.0	3.2	38 10		55.0
Savannah, Georgia.....	66.7	60.3	6.4	10 7		65.3
Smithville, North Carolina.....	68.0	59.4	8.6	10 0		59.4
Toledo, Ohio.....	55.2	41.6	13.6	12 2		45.7
Wilmington, North Carolina.....	63.6	59.0	4.6	19 8		60.5

* Observations interrupted by ice; see text.

ATMOSPHERIC ELECTRICITY.

AURORAS.

An auroral display occurred during the night of the 24-25th, which was reported from the Missouri valley eastward to Nova Scotia, the most southern point at which it was observed, being in southern Indiana. The following reports relate to this display:

Portland, Maine: a brilliant aurora was observed at 1.50

a. m. of the 25th, consisting of numerous streamers reaching the zenith; the display was obscured by clouds at 2.30 a. m.

Eastport, Maine: aurora from 7.25 p. m., until 3. a. m. of the 25th.

Point Judith, Rhode Island: at 8.30 p. m. of the 24th, an auroral display was observed through the clouds, its influence being felt on the telegraph lines one hour before the display was observed.

Toledo, Ohio: an aurora of moderate brightness was observed from 10 to 10.30 p. m. of the 24th.

Wauseon, Ohio: a moderately brilliant aurora was observed at 9 p. m. on the 24th in the form of short streamers extending upward from a partial arch in the northern sky.

Sunman, Indiana: an aurora was visible at 10 p. m. of the 24th.

Port Huron, Michigan: a diffuse auroral light, with occasional streamers, was observed in the northern sky at 10.50 p. m. of the 24th.

Grand Haven, Michigan: a faint aurora was observed from 9.10 to 11.45 p. m. of the 24th.

Milwaukee, Wisconsin: a brilliant auroral display was observed from 9 to 10.15 p. m. of the 24th, consisting of slender luminous beams having a constant motion.

Sussex, Wisconsin: a beautiful auroral display occurred on the 24th. It first appeared as a dark cloud 10° above the horizon, with streamers and "dancers" extending upward to the zenith. The influence of the aurora on the magnetic needle was very noticeable. Surveyors report that on the morning of the 24th the declination of the needle change 45' to the west, and on the afternoon of that date the instrument became useless. The effects of the aurora upon the needle did not disappear until 3 p. m. of the 25th.

Beloit, Wisconsin: a brilliant auroral display was observed from 8.30 to 10 p. m. of the 24th. It first appeared in the north as a white light, which gradually developed into an arch with several broad bands extending towards the zenith. Later the arch moved upward and the broad bands were succeeded by narrow beams of a pinkish color.

Alpena, Michigan: an aurora was observed at 8 p. m., of the 24th, consisting of a diffuse light, resting upon a dark base of dense haze, in the northwestern sky; at 8.30 p. m. the whole sky except that along the southern horizon was covered with the haze; at 8.40 p. m. very brilliant streamers appeared in the southern sky, reaching an altitude of 25°, and having an apparent motion from east to west; at 11 p. m. the aurora gradually faded away, leaving only a diffused light on the northern horizon.

Fort Totten, Dakota: an auroral beam was observed at 7.45 p. m. in the southern sky, and passing about 5° south of the zenith, terminating in the northwest. This beam was from 2° to 3° in width near the horizon, but at an altitude of 30° it widened abruptly to 9°; at 10.30 p. m. shooting beams were observed in the south. The display ended at 11 p. m.

Dubuque, Iowa: a brilliant aurora was visible from 9.30 to 9.55 p. m., consisting of slender beams extending from a luminous base to a height of 30°.

Davenport, Iowa: a bright aurora was observed in the northwest from 8.30 to 10 p. m., the light extending to an altitude of 45°.

Huron, Dakota: brilliant auroral beams were visible from 8.30 p. m., of the 24th, until after midnight.

Fort Bennett, Dakota: a faint aurora was seen from 9.20 to 9.30 p. m., appearing as slender columns of pale straw-colored light.

Yankton, Dakota: a faint aurora, in the form of an arch, with parallel beams reaching nearly to the zenith, was observed from 9.10 to 9.45 p. m.

Other auroral displays were observed during the month, as follows:

5th.—Manitowoc, Wisconsin.

11th.—Woodstock, Vermont; Westerville, Ohio.

14th.—Cornish and Orono, Maine; Wellsborough, Pennsylv-

vania; Providence, Rhode Island; Halifax, Nova Scotia; Charlottetown, Prince Edward Island.

15th.—Sidney, Nova Scotia.

16th.—Fort Myer, Virginia.

17th.—Westerville, Ohio; Grand Haven, Fort Brady, Manistique, Marquette and Swartz Creek, Michigan; Bismarck and Forts Buford and Totten, Dakota; Milwaukee, Wisconsin; Riley, Illinois.

18th.—Mount Washington, New Hampshire; Fort Brady, Michigan; Fort Totten, Dakota.

19th.—Saint Vincent, Minnesota; Fort Totten and Webster, Dakota.

20th.—Westerville, Ohio; Manchester, Iowa.

21st.—Fort Wayne, Indiana.

22d.—Beloit, Wisconsin.

23d.—Wabash, Indiana.

25th.—Westerville, Ohio.

26th.—Cornish, Gardiner and Orono, Maine; Newport, Vermont; Cambridge, Massachusetts; Westerville, Ohio.

27th.—Orono, Maine.

28th.—New Haven, Connecticut.

THUNDER-STORMS.

Thunder storms were reported in the various districts, as follows:

New England.—2d, 15th to 17th.

Middle Atlantic states.—1st, 2d, 8th, 14th to 17th, 25th to 27th.

South Atlantic states.—1st, 2d, 8th, 13th to 16th, 19th, 21st, 24th to 28th.

Florida peninsula.—5th, 6th, 12th, 14th to 17th, 20th to 23d.

Eastern Gulf states.—1st, 5th, 7th, 8th, 11th to 15th, 17th to 21st.

Western Gulf states.—1st, 3d, 4th, 5th, 10th, 11th, 13th, 14th, 17th to 20th, 26th to 30th.

Rio Grande valley.—11th, 20th, 27th to 30th.

Tennessee.—1st, 2d, 7th, 13th to 15th, 17th, 18th, 19th, 27th to 30th.

Ohio valley.—1st, 2d, 3d, 14th, 15th, 27th to 29th.

Lower lake region.—1st, 2d, 14th to 16th, 27th, 28th, 30th.

Upper lake region.—1st, 7th, 14th, 15th, 18th, 22d, 26th, 27th, 29th, 30th.

Extreme northwest.—Saint Vincent, Minnesota, 29th.

Upper Mississippi valley.—1st, 5th, 12th, 13th, 14th, 17th, 18th, 19th, 26th to 30th.

Missouri valley.—1st, 5th, 12th, 13th, 14th, 17th to 22d, 25th, 26th, 28th to 30th.

Northern slope.—13th, 17th, 26th, 28th.

Middle slope.—2d, 3d, 5th, 6th, 11th to 14th, 17th to 20th, 25th to 30th.

Southern slope.—4th, 13th, 18th, 27th to 30th.

Southern plateau.—4th, 10th, 11th, 16th, 27th, 29th.

Middle plateau.—Utah: Salt Lake City, 11th, 16th; Nephi, 11th, 30th;

Northern plateau.—10th, 21st, 22d, 25th, 29th.

North Pacific coast region.—4th, 5th, 9th, 10th, 21st, 27th.

California.—Los Angeles: 3d; Sacramento and Hydesville, 9th, Princeton, 8th, 9th, 28th; San Francisco, 24th; San Diego, 27th; Benicia Barracks, 28th.

During a thunder storm on the afternoon of the 16th, at Portland, Maine, a violent electrical explosion occurred. Numerous windows were broken by the concussion, and several persons were stunned. Considerable damage was done to the telephone exchange and telegraph office in this city.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—2d to 5th, 9th, 12th, 14th, 15th.

Middle Atlantic states.—1st, 5th, 6th, 7th, 12th, 18th, 20th, 25th, 28th.

South Atlantic states.—1st to 4th, 14th, 16th, 18th, 21st, 28th.

Florida peninsula.—Archer, 15th.

Eastern Gulf states.—Pensacola, Florida, 1st.

Western Gulf states.—Fort Smith, Arkansas, 5th; Lead Hill, Arkansas, 1st, 3d, 4th, 6th, 13th, 17th, 25th, 30th.

Tennessee.—1st, 5th, 7th, 11th, 17th, 20th, 30th.

Ohio valley.—1st, 3d to 6th, 8th, 11th, 19th, 28th, 29th, 30th.

Lower lake region.—North Volney, New York, 13th; Toledo, Ohio, 18th, 30th.

Upper lake region.—2d, 6th, 12th, 13th, 17th, 18th, 21st, 22d, 25th, 26th, 29th, 30th.

Extreme northwest.—Fort Buford, Dakota, 10th, 16th.

Upper Mississippi valley.—5th, 11th, 15th, 17th, 21st, 22d, 26th, 27th, 29th, 30th.

Missouri valley.—Vermilion, Dakota, 16th, 20th.

Northern slope.—Genoa, Nebraska, 4th, 5th, 16th.

Middle slope.—Independence, Kansas, 24th.

Southern plateau.—El Paso, Texas, 26th, 27th; San Carlos, Arizona, 26th.

Middle plateau.—1st, 2d, 4th, 5th, 6th, 8th, 11th, 12th, 20th, 22d.

Northern plateau.—Boisé City, Idaho, 19th, 26th; Dayton, Washington Territory, 12th.

North Pacific coast region.—Oregon: Roseburg, 6th, 7th, 17th; Albany, 7th, 19th; East Portland, 19th.

Middle Pacific coast region.—1st to 9th, 15th, 20th, 21st, 22d, 24th, 27th.

LUNAR HALOS.

New England.—5th, 8th, 10th, 11th, 15th.

Middle Atlantic states.—1st, 3d, 5th, 7th, 13th, 28th.

South Atlantic states.—1st, 3d to 6th, 30th.

Florida peninsula.—1st, 2d, 3d.

Eastern Gulf states.—1st to 4th, 10th.

Western Gulf states.—1st, 3d, 4th, 9th, 29th.

Tennessee.—3d, 6th, 7th, 9th, 30th.

Ohio valley.—6th, 10th, 17th, 28th, 29th, 30th.

Lower lake region.—1st, 2d, 3d, 5th, 8th, 30th.

Upper lake region.—2d, 4th to 7th, 11th, 12th, 14th, 28th, 30th.

Extreme northwest.—Fort Totten, Dakota, 5th; Fort Buford, Dakota, 10th.

Upper Mississippi valley.—3d, 6th, 27th to 30th.

Missouri valley.—Fort Bennett, Dakota, 8th.

Northern slope.—Fort Shaw, Montana, 1st; Fort Custer, Montana, 6th; Fort Meade, Dakota, 26th.

Middle slope.—3d, 7th, 8th, 9th.

Southern slope.—Fort Elliott, Texas, 4th; Fort Stockton, Texas, 6th.

Southern plateau.—1st, 3d, 6th, 8th.

Middle plateau.—Nephi, Utah, 1st, 8th; Carson City, Nevada, 1st, 6th; Salt Lake City, Utah, 1st, 9th, 30th; Fort Lewis, Colorado, 7th, 8th.

Northern plateau.—Dayton, Washington Territory, 4th; Spokane Falls, Washington Territory, 5th.

North Pacific coast region.—2d, 3d, 5th, 7th.

Middle Pacific coast region.—4th, 5th, 6th, 8th.

South Pacific coast region.—1st, 4th, 5th.

MIRAGE.

Galveston, Texas.—During the afternoon of the 22d, the mainland seemed much nearer than usual, and all elevated and distant objects were seen with great distinctness. A similar phenomenon was also observed on the 23d.

Milwaukee, Wisconsin.—From 2 p. m., of the 24th, until after sunset, Whitefish bay, six miles distant and ordinarily hidden from view, was plainly seen.

Mirages were also observed at the following places:

Webster, Dakota, 16th, 19th, 20th, 21st, 22d, 23d, 24th.

Pretty Prairie, Kansas, 18th, 10th.

Manistique, Michigan, 22d, 23d.

Duluth, Minnesota, 28th.

Red Willow, Nebraska, 17th.

Indianola, Texas, 22d, 24th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and fifty-eight stations show 4,721 observations to have been made, of which four were reported doubtful; of the remainder, 4,717, there were 3,982, or 84.4 per cent., followed by the expected weather.

SUN SPOTS.

North Lewisburg, Ohio, 30th.—Sun spots were observed on all clear days during the month.

Capt. T. E. Blagden, of the bark, "Gloire," reported: "on April 26th, in latitude N. 46° 45', W. 32° 00' observed a large spot on the sun's disc, with several smaller spots near it."

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for April, 1884:

Date— April, 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 12 m.....	1	20½	0	0	1	5	5	40½	
7, 10 a. m....	0	0	0	0	0	0	0	45½	
8, 10 a. m....	2	12½	1	2	1	1	7	55½	
11, 10 a. m....	0	0	0	0	0	0	4	55½	
12, 10 a. m....	0	0	0	0	0	0	4	55½	
14, 11 a. m....	1	3	1	10½	1	3	4	45½	
20, 4 p. m....	0	0	0	0	0	0	9	55½	
21, 1 p. m....	0	5½	0	5½	0	5½	9	55½	
22, 10 a. m....	0	20½	1	5½	0	5½	8	70½	
23, 3 p. m....	1	20½	0	0	0	0	8	90½	
24, 9 a. m....	0	25½	1	5½	0	0	7	110½	
26, 4 p. m....	1	10½	3	15½	1	10½	5	105½	
27, 10 a. m....	0	5½	0	0	0	5½	5	160½	
28, 7 a. m....	0	5½	0	0	0	0	4	95½	
5 p. m....	0	0	0	0	0	0	4	95½	
30, 10 a. m....	0	5½	0	10½	0	0	4	90½	

Faculae were seen at the time of every observation. † Approximated.

EARTHQUAKES.

Eureka, Humboldt county, California, 12th: numerous slight shocks of earthquake were felt here during the past week. They occurred on the mornings of the 6th, 8th, and 11th.

Carson City, Nevada: a sharp shock of earthquake occurred at 2.10 p. m. of the 11th; duration three seconds; vibration from northwest to southeast. The shock was also felt at Virginia City, about fifteen miles distant.

Hydesville, Humboldt county, California: a slight shock of earthquake occurred at 6.20 a. m. of the 6th, lasting about twenty seconds; it was a mere tremor; the direction was not determined.

Oakland, California: a slight shock of earthquake, accompanied by a slow rumbling noise, occurred at 9.10 p. m. of the 17th; the vibration was from northwest to southeast. Another slight shock was felt at 11.30 a. m. of the 20th; it was scarcely noticeable.

London, England: at 9.30 a. m. of the 22d an earthquake shock of considerable force was felt in the eastern counties of England. The disturbance was most severe in Essex and Suffolk counties. At Ipswich, Suffolk county, the shock was so severe that the walls of the houses were perceptibly shaken. The shock was still more violent at Colchester in Essex county, where the tall chimney-stacks of factories and other high structures were wrecked. The damage caused by the earthquake at Colchester is estimated at £10,000. The shock was also severe at Chelmsford, about thirty miles from London. The wave passed from south to north.

Ogreeta, Cherokee county, North Carolina: at 6.46 a. m. of the 30th a low rumbling sound of earthquake, like rolling thunder, was heard; noise apparently from a point nearly due north of here.

PRAIRIE AND FOREST FIRES.

Raleigh, North Carolina: for several days preceding the 4th, very destructive forest fires prevailed in the southern part of this state, the fires extending into six or seven counties,

and destroying some of the largest turpentine orchards in the state. At Manley, on the Raleigh and Augusta railway, a number of houses and much lumber were burned.

Grand Rapids, Michigan.—A large amount of property consisting of fences, railroad ties, etc., was destroyed by forest fires on the 27th.

Prairie and forest fires were also reported from the following places:

Fort Smith, Arkansas, 1st, 10th.
Bismarck, Dakota, 16th, 22d, 25th.
Fort Buford, Dakota, 20th to 24th.
Fort Meade, Dakota, 22d, 23d.
Yankton, Dakota, 3d, 9th, 10th, 17th, 18th, 22d, 23d, 24th, 29th.
Humboldt, Iowa, 4th.
Dodge City, Kansas, 5th, 6th.
Independence, Kansas, every day in the month except 11th, 20th, 21st, 30th.
De Soto, Nebraska, 24th.
North Platte, Nebraska, 16th to 21st, 30th.
Chambersburg, Pennsylvania, 29th, 30th.
State College, Pennsylvania, 29th.
Troy, Pennsylvania, 29th, 30th.
Wilkesbarre, Pennsylvania, 28th, 29th, 30th.
Humphrey, New York, 27th.
New River Inlet, North Carolina, 2d.
Fort Elliott, Texas, 15th.

METEORS.

Block Island, Rhode Island: at 11.50 p. m. of the 26th, a meteor was observed moving eastward from the zenith, and exploded into two pieces, when 45° from the horizon; it left a train of reddish light which remained visible for ten seconds.

Meteors were also seen at the following places:

1st.—Clarksville, Texas.
3d.—Salina, Kansas.
7th.—Pittsburg, Pennsylvania.
11th.—Variety Mills, Virginia.
12th, 13th, 14th.—Somerset, Massachusetts.
18th, 19th.—Woodstock, Maryland.
19th.—Webster, Dakota.
25th.—Lead Hill, Arkansas; Red Willow, Nebraska.
27th.—Wytheville, Virginia.

MIGRATION OF BIRDS.

Geese flying northward.—Fort Canby, Washington Territory, 30th; Hydesville, California, 9th; Princeton, California, 17th, 18th, 23d, 24th; Portland, Maine, 12th; Grand Haven, Michigan, 25th; Moorhead, Minnesota, 7th, 11th, 13th; Saint Vincent, Minnesota, 9th; Albany, Oregon, 20th; Astoria, Oregon, 23d, 30th; Point Judith, Rhode Island, 1st, 3d to 8th, 10th, 11th; Chincoteague, Virginia, 2d; Manistique, Michigan, 21st.

Ducks flying northward.—Saint Vincent, Minnesota, 9th.

Cranes flying northward.—Indianola, Iowa, 14th; Edgington, Illinois, 5th.

Pigeons flying northward.—New Haven, Connecticut, 5th.

POLAR BANDS.

Los Angeles, California, 8th.
Archer, Florida, 1st, 12th, 13th.
Riley, Illinois, 28th, 30th.
Escanaba, Michigan, 5th.
Moorestown, New Jersey, 18th.
Vineland, New Jersey, 30th.
Mountainville, New York, 22d, 30th.
Wauseon, Ohio, 2d, 18th.
Charleston, South Carolina, 13th.
Nashville, Tennessee, 6th, 7th, 12th, 26th, 27th.
El Paso, Texas, 17th.
Norfolk, Virginia, 10th.

WATER SPOUTS.

A special despatch to the "Saint Louis Globe-Democrat" from Corpus Christi, Texas, on the 8th, stated: that a part of

the crew of the schooner "Juniata Julia" arrived at that place on the above date and reported that during the night of April 4th the schooner was capsized by a water sport during her voyage from Tuxpan, Mexico, to Galveston, Texas.

Fort Macon, North Carolina: a water spout moving north-eastward was observed near Bogue inlet on the 15th.

New River Inlet, North Carolina: at 9.20 a. m. of the 15th a small water-spout was observed about one mile southeast of this station. The base of the column was about ten feet in diameter, and its height about twenty feet, the color being a dark grey. It moved in a southeasterly direction, and was accompanied by a roaring noise.

ZODIACAL LIGHT.

Archer, Florida, 17th, 22d.
Key West, Florida, 26th.
Pensacola, Florida, 12th, 16th.
Portland, Maine, 23d.
Harvard College Observatory, Massachusetts, 12th, 13th, 14th, 22d, 23d, 26th, 27th.
Escanaba, Michigan, 2d, 4th, 5th, 6th, 23d.
Nashville, Tennessee, 15th, 16th, 25th, 26th.
Variety Mills, Virginia, 15th, 16th, 17th.

DROUGHT.

Corpus Christi, Nueces county, Texas, 24th: stockmen report that large numbers of cattle are dying on account of scarcity of water and poor pasturage caused by drought.

SAND STORMS.

Arizona.—Yuma, 10th, 24th, 26th.
New Mexico.—Fort Union, 1st.

NOTES AND EXTRACTS.

REPORT OF THE MISSOURI WEATHER SERVICE, APRIL, 1884.

The temperature during April has been 53°.0 at Central Station, which is three degrees below the normal. The mean April temperature has fallen to or below 53°.0 twelve times during the last forty-seven years, and has fallen as low as 44°.2, in the year 1857. The lowest observed means in the state during the past April were 48°.6 at Lexington, and 49°.3 at Oregon. The highest means were 56°.4, at Springfield, and 56°.2, at Cairo.

The temperature of the air fell to 32° for the last time on the 8th, at Saint Louis, that being the coldest temperature of the month. Over a region lying south and east of a line running through Saint Louis, Chamois, and thence southward near Iron Mountain, the temperature did not fall below 32°. The highest minimum was 37° at Cairo. The lowest minimum of 21° at Centreville, is probably an error, or may be due local causes. Other minima are 24° at Oregon; 27° at Lexington; and 28° at Keokuk and Hannibal. The maximum temperatures reported were, 87° at Glasgow, and 84° at Centreville, Chamois, Boonville, and Miami.

The rainfall at the Central Station was 3.92 inches, which is about normal. In the state the rainfall has been greatest, or over four inches, in the south-western part. The maximum of 6.50 inches occurred at Greenfield. The least fall, slightly exceeding one inch, occurred in the northeastern part of the state.

A small tornado occurred at Lamar, but the date is not given. A small whirlwind occurred about six miles southwest of Greenfield on the 18th, causing one death.

Miami reports a peculiar electrical phenomena in the east at 23 hours on the 15th. It had a comet-like appearance, the tail or streamer turning first towards the north then towards the south.

On the 9th, a heavy snowfall occurred in central Missouri, the flakes measuring three to four inches in diameter at Miami and at Glasgow, they were two inches wide and three inches long.

The spring has, on the whole been a very favorable one although a little late.

Correction.—In second line from top, in March report, for four read fourteen.

FRANCIS E. NIPHER,

Director.

WEATHER REPORT FOR APRIL, 1884.

Prepared by Prof. F. H. Snow, of University of Kansas, from observations taken at Lawrence.

The chief meteorological features of this month were the low temperature (the lowest April mean since 1875), the excessive cloudiness, and the abundant rainfall, which surpassed that of any previous April upon our seventeen years' record. The prolonged snow storm of the 21st was a very exceptional occurrence at so late a date. There were no injurious frosts.

Mean temperature.—50°.42, which is 3°.80 below the April average. The highest temperature was 76°.5 on the 17th, this being the lowest April maximum in our record; the lowest temperature was 28°.5 on the 8th, giving a

monthly range of 48°. Mean temperature at 7 a. m., 45°.77; at 2 p. m., 58°.37; at 9 p. m., 48°.77.

Rainfall.—5.62 inches, which is 2.63 inches above the April average of the sixteen preceding years. Rain fell on thirteen days. There were four thunder showers. A very moist snow fell all day on the 21st, melting nearly as fast as it fell. It is estimated that the entire depth of the snow was at least six inches. The entire rainfall for the four months of 1884 now completed has been 10.76 inches, which is 3.06 inches above the average for the same months in the preceding sixteen years.

Mean cloudiness.—55.76 per cent. of the sky, the month being 7.41 per cent. cloudier than usual. Number of clear days (less than one-third cloudy), 6; half clear (from one to two thirds cloudy), 15; cloudy (more than two-thirds), 9. There were two entirely clear days and five entirely cloudy. Mean cloudiness at 7 a. m., 57.60 per cent.; at 2 p. m., 70 per cent.; at 9 p. m., 39.67 per cent.

Wind.—NW., twenty-three times; se., twenty times; sw., nineteen times; ne., fourteen times; n., seven times; s., three times; e., three times; w., once. The total run of the wind was 13,954 miles, which is 118 miles below the April average. This gives a mean daily velocity of 465.13 miles and a mean hourly velocity of 19.38 miles. The highest velocity was 60 miles an hour, on the 9th, from 5 to 6 p. m.

Barometer.—Mean for the month, 29.001 inches; at 7 a. m., 29.002 inches; at 2 p. m., 28.979 inches; at 9 p. m., 29.021 inches; maximum, 29.321 inches on the 3d; minimum, 28.495 inches on the 26th; monthly range, 0.826 inch.

Relative humidity.—Mean for the month, 65.9 per cent.; at 7 a. m., 75.5; at 2 p. m., 49.6; at 9 p. m., 72.7; greatest, 100. on the 13th, 19th, and 21st; least, 19. on the 5th. There was one fog.

The following table furnishes a comparison with the seventeen previous Aprils:

April.	Mean temperature.	Maximum temperature.	Minimum temperature.	Rain (inches).	Snow (inches).	Rainy days.	Thunder-storms.	Mean cloudiness.	Humidity.	Number of fogs.	Miles of wind.	Mean barometer.	Maximum barometer.	Minimum barometer.
1868.....	49.55	83.0	25.0	2.95	0.00	10	3	52.00	.....	1	.....	.....	.....	.....
1869.....	51.44	87.0	18.0	2.43	1.00	10	2	51.00	72.1	0	.....	29.006	29.407	28.388
1870.....	56.84	91.0	19.0	1.08	0.00	8	1	49.33	54.7	1	.....	29.081	29.359	28.700
1871.....	57.90	92.0	30.5	2.38	0.00	8	3	47.11	53.5	0	.....	28.891	29.331	28.299
1872.....	56.42	85.0	30.0	4.74	0.00	12	7	55.12	56.5	1	.....	28.999	29.443	28.401
1873.....	48.85	88.0	26.0	4.42	2.00	9	2	55.89	63.4	0	18,371	28.967	29.349	28.533
1874.....	48.77	83.0	22.5	2.86	0.00	8	2	51.11	57.7	0	14,784	29.100	29.422	28.653
1875.....	49.70	82.0	23.0	2.54	0.00	10	2	48.22	57.6	0	14,144	29.075	29.395	28.676
1876.....	55.60	87.5	30.0	3.38	0.00	7	5	44.78	59.6	0	14,442	29.035	29.418	28.684
1877.....	53.90	81.0	25.0	3.13	0.00	11	4	53.00	64.9	1	11,976	28.995	29.537	28.364
1878.....	58.60	82.0	36.0	5.48	0.00	7	5	38.22	66.0	1	11,482	28.851	29.242	28.335
1879.....	56.40	84.0	20.0	4.18	0.00	10	6	49.67	61.0	0	11,231	29.062	29.467	28.684
1880.....	56.92	93.0	31.0	1.75	0.00	6	4	34.56	53.4	0	16,709	29.029	29.550	28.303
1881.....	52.47	84.0	13.0	1.75	0.00	9	4	51.78	67.6	0	14,495	29.084	29.501	28.622
1882.....	56.83	88.0	35.0	3.20	0.00	9	5	51.77	61.7	0	14,220	29.032	29.449	28.542
1883.....	57.18	89.5	35.0	2.12	0.00	8	2	40.11	53.3	2	12,936	28.957	29.473	28.269
1884.....	50.42	76.5	28.5	5.62	6.00	13	4	55.76	65.9	1	13,954	29.002	29.321	28.495
Mean	54.00	85.6	26.4	3.14	0.50	9	4	48.79	60.5	0.5	14,063	29.010	29.416	28.498

The following extract has been taken from the report of the "Alabama Weather Service," for the month of April, 1884, under the direction of Professor P. H. Mell, Jr., Director:

AGRICULTURAL AND MECHANICAL COLLEGE,

Auburn, Alabama, May 1, 1884.

The month of April opened with two weeks of cool, dry weather, the atmosphere being generally hazy, and the wind northwest. The average rainfall reported from eleven stations up to the 14th, was only .38 of an inch, other stations reporting none. On the 9th and 10th, during the prevalence of this drought, heavy frosts in the northern part of the state were reported as doing much damage to the fruit crop. Slight frosts occurred at the same time in middle and southern Alabama. Crops and gardens throughout the state were considerably retarded during this period.

From 14th to the 21st, the precipitation was greater. Heavy rainfalls, attended by violent winds and grand displays of electricity, were quite general, and are described as disastrous in several places.

From the 22d to the 25th, a cold wave passed over the state. The 24th was the coldest day during this period, the average temperature being 47°.6. The lowest temperature for this day is reported from Selma, 31°. Slight frosts were noticed on the 24th to the 30th, some light showers were reported but the month was generally dry, atmosphere hazy, temperature warmer, winds variable. Encouraging reports come from all sections that crops are growing rapidly, and farmers seem cheerful.

SUMMARY.

Mean temperature, 63°.
Highest temperature, 94° at Calera, on the 29th.
Lowest temperature, 28° at Calera, on the 10th.
Range of temperature, 66°.
Mean depth of rainfall, 4.16 inches.
Mean daily rainfall, .14 inch.
Greatest depth of monthly rainfall, 7.37 inches at Scottsborough.

Least depth of monthly rainfall, 1.77 inches, at Selma.
 Prevailing direction of wind, northwest.
 Greatest force of wind, reported from Tusculumbia and Greensborough on the 14th, 70 miles per hour; Marion and Birmingham on the 14th, 40 miles per hour; Chattanooga, on the 2d, 40 miles per hour.
 Average number of cloudy days, 12.
 Average number of clear days, 6.
 Average number of fair days, 12.
 Average number of days on which rain fell, 8.
 Days of general rainfall, 12th, 13th, 19th, 21st.
 Greatest daily average rainfall, for the state, 1.10 on 15th.
 Heaviest rainfall, Birmingham, 15th, 3.50 inches.
 Hottest days, 9th, 10th, 24th, 25th.
 Coldest days, 9th, 10th, 24th, 25th.
 Hail storms occurred on the 1st, 14th and 19th.
 Thunder storms occurred on the 1st, 13th, 14th, 15th, 18th, 19th, 20th, 26th. Those of the 14th, 15th, 18th and 19th were general over the state.
 Frosts occurred on the 2d, 9th, 10th, 24th, 25th.
 While the precipitation was lighter than usual for this month, there was a large proportion of cloudy days; some stations report the sun not visible for a week, and some report only one clear day.

The following meteorological summary for April, 1884, and table showing the dates of the first and latest frosts and snow-falls at New Orleans for each winter from 1870-71, to 1883-84, are taken from the first report (for April, 1884) of the "Louisiana Weather Service."

Winters of—	Frosts.		Snows.	
	First.	Last.	First.	Last.
1870-71.....	Dec. 20	Jan. 15	*	*
1871-72.....	Dec. 1	Feb. 3	*	*
1872-73.....	Nov. 30	Jan. 19	*	*
1873-74.....	Nov. 20	Jan. 30	*	*
1874-75.....	Nov. 26	Feb. 10	*	*
1875-76.....	Dec. 18	Feb. 16	*	*
1876-77.....	Nov. 21	Feb. 18	*	*
1877-78.....	Nov. 11	Jan. 25	Jan. 1	Jan. 1
1878-79.....	Nov. 1	Feb. 11	Dec. 26	Dec. 26
1879-80.....	Nov. 20	Feb. 27	Jan. 5	Jan. 5
1880-81.....	Nov. 16	April 2	Dec. 29	Jan. 24
1881-82.....	Nov. 24	Feb. 5	Dec. 25	Dec. 25
1882-83.....	Nov. 30	Jan. 23	Jan. 9	Jan. 9
1883-84.....	Dec. 16	Feb. 15	None.	None.

* None recorded.

STATE SUMMARY.

Mean temperature, 65° 8.
 Highest temperature, 87°, at Minden on the 19th, and at Cheneyville on the 28th.
 Lowest temperature, 36°, at Coushatta on the 9th.
 Monthly range of temperature, 51°.
 Greatest daily range of temperature, 45°, at Minden on the 23d.
 Least daily range of temperature, 1°, at Coushatta on the 21st.
 Average rainfall, 4.68 inches.

The following extract has been taken from the report of the "Tennessee Weather Service" for April, 1884:

The meteorological conditions of the month were without any feature of especial interest, except the generally low temperature during the early part, and the excessive precipitation about the 14th.

The mean temperature was 55° 57, 6° 57 above that of March and 6° below that of April, 1883. The minimum was 25°, 15° above that of March and 5° above that of April, 1883. The temperature ranged highest during the last days of the month, and lowest about the 9-11th.

The average precipitation for the month was 4.95 inches, 2.95 inches below that of March and 1.95 inches below that of April, 1883. The days of greatest precipitation were the 12th, 14th, 18th, 21st, 22d, 27th, and 28th. The greatest daily precipitation occurred on the 14th, when it averaged 2.38 inches for the entire state, and at some stations it amounted to nearly 4.00 inches.

STATE SUMMARY OF REPORTS.

Mean temperature, 55° 57.
 Highest temperature, 86°, on 29th at Tennessee University.
 Lowest temperature, 25°, on the 9th at Beach Grove and Hurricane Switch.
 Range of temperature, 61°.
 Greatest daily range of temperature, 42°, on the 27th at Tennessee University.

Least daily range of temperature, 0°, on the 2d at Hohenwald, and 1° on the 10th at Centerville, on the 12th at Smithville, Flat Creek and Howell, on the 14th at Greeneville and Darnall, on the 22d at Hurricane Switch, on the 23d at Hurricane Switch, Fostoria, and Kingston Springs, and on the 28th at Alexandria.

Mean depth of rainfall, 4.95 inches.

Mean daily rainfall, .165 inch.

Greatest depth of rainfall, 8.77, at Trenton.
 Least depth of rainfall, 2.15, at Sunbright.
 Average number of clear days, 7.7.
 Average number of fair days, 7.3.
 Average number of cloudy days, 15.
 Average number of days on which rain fell, 8.4.
 Prevailing direction of the wind, south.

The following meteorological summary and remarks are taken from the May report of the Department of Agriculture for Illinois:

The mean temperature of April, 1884, is below the average for a term of years, and the rainfall was less than usual for the same months in the two preceding years.

The mean temperature of the past seven Aprils in the several divisions of the state is as follows:

Division.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
Northern.....	53.0	46.0	49.0	40.8	48.6	48.1	46.9
Central.....	58.0	51.0	52.0	45.2	53.4	53.2	51.0
Southern.....	60.0	55.0	57.0	53.3	58.6	57.4	53.3
Average.....	57.0	50.7	53.7	46.4	53.3	52.9	50.4

It will be seen from the above table that the mean temperature of April 1884, is lower than for any corresponding month since 1877, with the exception of April, 1881.

The average monthly rainfall, including melted snow, for the past seven Aprils is as follows:

Division.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
Northern.....	3.72	2.13	4.29	1.81	4.55	3.86	2.77
Central.....	3.63	1.99	4.29	1.89	4.14	4.66	2.33
Southern.....	5.20	2.41	3.22	4.11	2.84	4.54	3.57
Average.....	4.18	2.18	3.93	2.60	3.84	4.15	2.89

The mean precipitation for the state has not been less than that of April, 1881; for the corresponding during the past seven years but twice, viz.: 1879 and 1881.

Mr. W. R. Thompson, director of the "Nebraska Weather Service," furnishes the following report:

NEBRASKA WEATHER SERVICE, BULLETIN FOR APRIL, 1884.

The general character of the month was wet and cool.

Rainfall.—The average by sections was as follows: southeast, 3.44 inches; northeast, 3.06 inches; southwest, 2.92 inches; northwest, 2.55 inches; average for state, 2.99 inches.

Temperature.—The mean temperature of the air was 45° 75; the average of all noon observations was 51° 41.

Mean relative humidity.—North Platte, 69.1 per cent.; De Soto, 68.3 per cent.; Agricultural college, 74.8 per cent.; Crete, 77.0.

Wind.—Number of miles traveled: North Platte, 9,067; Crete, 11,473; Agricultural College, 10,740.

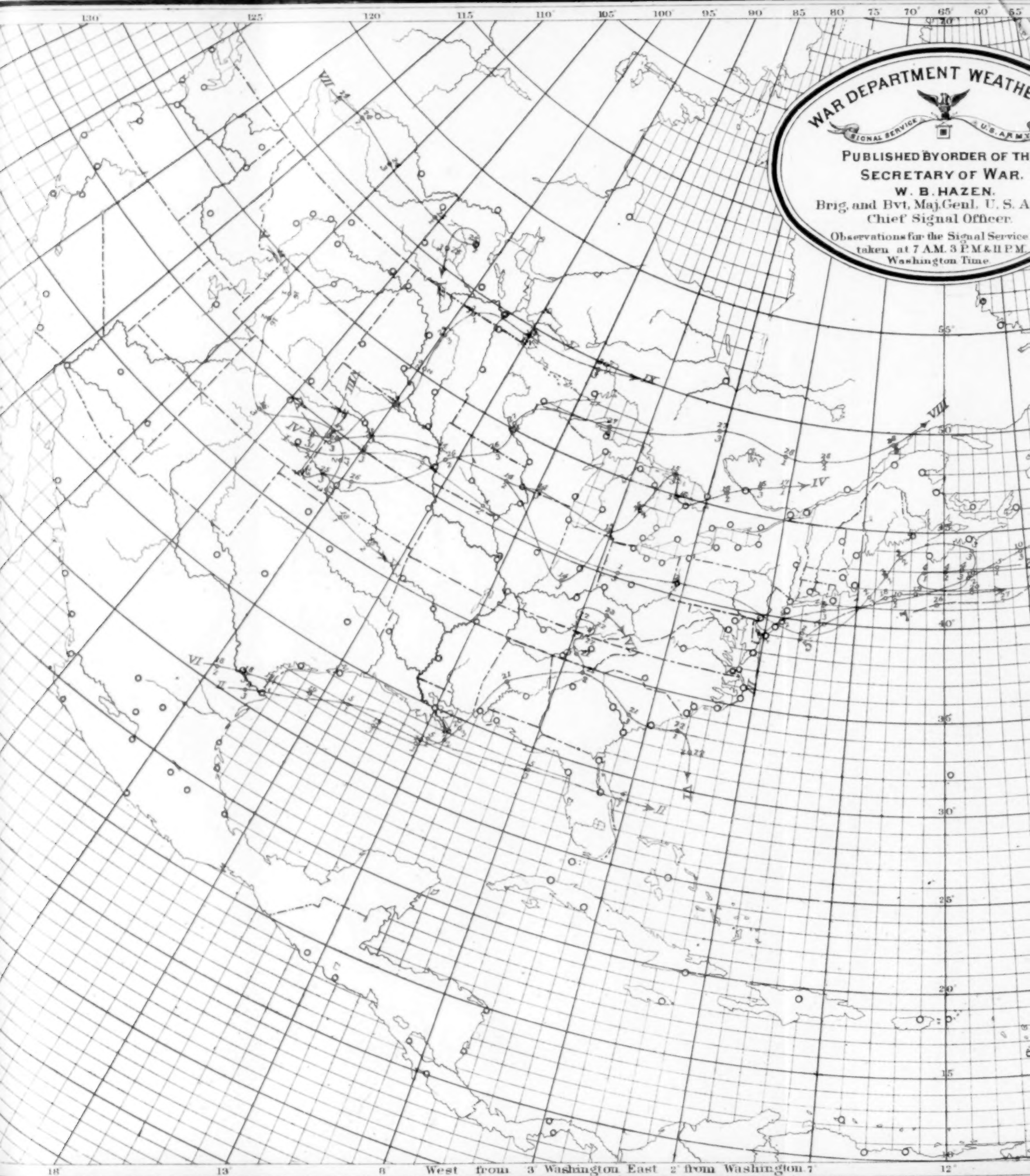
The following meteorological summary is taken from the April report of the Commissioner of Agriculture for Georgia:

Districts.	Temperature			Average precipitation.	
	Mean of maximum.	Mean of minimum.	Monthly mean.	Inches.	Average number of rainy days.
Northern.....	85	32	57.0	6.49	8
Middle.....	86	35	60.2	5.20	8
Southwestern.....	86	44	63.0	4.07	5
Eastern.....	85	34	60.0	3.60	8
Southeastern.....	88	50	66.7	2.85	6
Means for the state.....	86	39	61.4	4.44	7

Mr. W. H. Ragan, director of the "Indiana Weather Service," furnishes the following meteorological summary for April, 1884:

Districts.	Mean temperature.	Precipitation.
		Inches.
Averages for northern counties.....	46.5	1.54
Averages for central counties.....	48.6	2.72
Averages for southern counties.....	51.5	31.7
Averages for state.....	48.8	2.71

Chart I. Tracks of Low-Barometer Area



WAR DEPARTMENT WEATHER
SIGNAL SERVICE U.S. ARMY
PUBLISHED BY ORDER OF THE
SECRETARY OF WAR.
W. B. HAZEN.
Brig. and Bvt. Maj. Genl. U. S. A.
Chief Signal Officer.
Observations for the Signal Service
taken at 7 A.M. 3 P.M. & 11 P.M.
Washington Time

ORDER OF THE
OF WAR.
IAZEN.
Genl. U. S. Army
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Signal Service are
3 P M & 11 P M
m Time

Limit of Ice

Chart II. Isobars, Isotherms, and Winds, April, 1884.

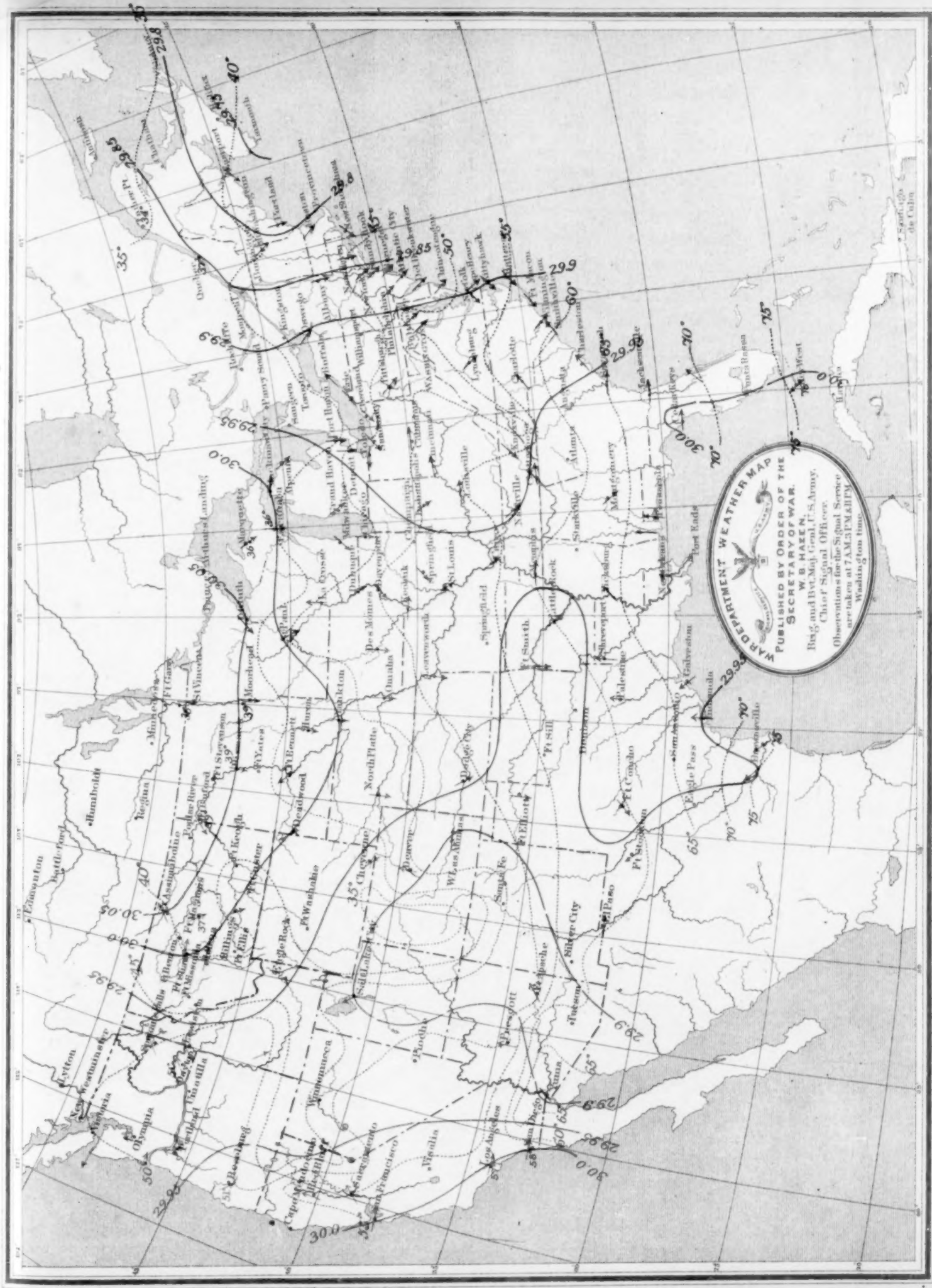
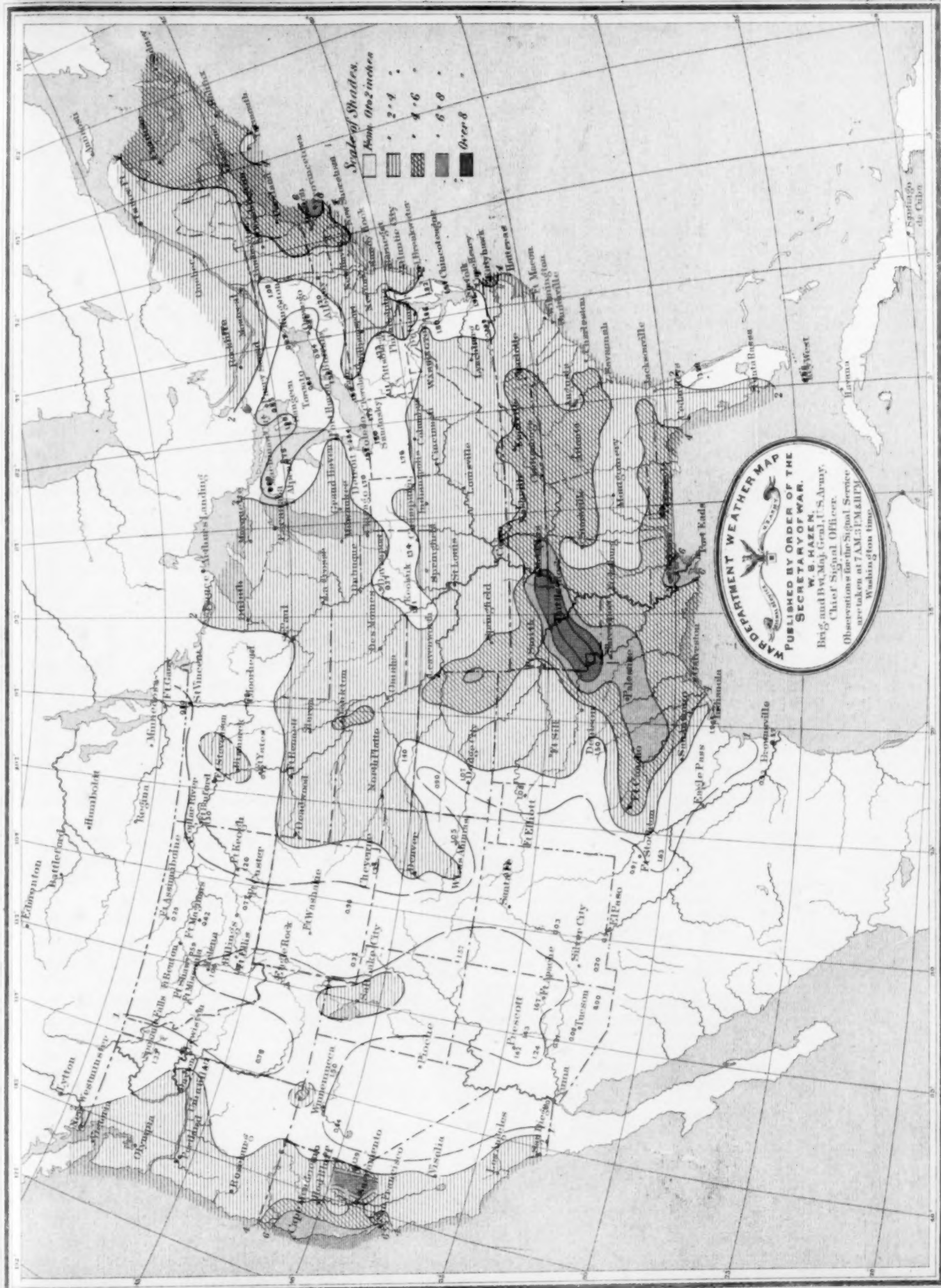


Chart III. Precipitation, April, 1884.



WARPARENT WEATHER MAP
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